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ECONOMIC GEOGRAPHY

ECONOMIC GEOGRAPHY

WITH SPECIAL REFERENCE TO
THE BRITISH EMPIRE

BY

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PREFACE

THIS book is primarily intended as a text-book for use in connection with professional examinations, such as that of the Institute of Bankers, in which candidates are expected to show a detailed knowledge of the economic geography of the British Empire, in addition to a thorough grasp of general principles. It should, however, be found helpful by teachers and the more advanced students in secondary schools, in providing the recapitulation from the point of view of the British Empire, which is required by the syllabus of the London University Matriculation Examination.

The account given has been made as up-to-date as possible, and, in order to provide the necessary basis for geographical reasoning—so rightly emphasised to-day—the early chapters have been planned to cover the chief factors influencing commerce and the principal commodities entering world trade. In dealing with the countries of the Empire, the author has tried to give a clear account of their physical conditions as affecting commerce, and of the stage of economic development attained. It has also been his aim to stimulate his readers' power of geographical enquiry as regards possibilities of future expansion.

The diagrams and sketch-maps with which he has illustrated the book have been kept as simple and clear as possible, and are intended to encourage, and in no way to take the place of, the study of the atlas. It will be seen that in the railway maps the chief towns on each route have been represented by the initial letters of their names. In this way not only has the clarity of the maps been ensured, but a useful exercise has been provided which will, it is hoped, be of considerable value in assisting students to remember the towns served by each of the principal lines.

It is not possible for the author to acknowledge the many sources from which he has necessarily drawn much of his information and inspiration, but he wishes to express his indebtedness to Miss M. Sclare, B.A. (Econ.), and to Mr. L. B. Cundall, M.Sc., F.R.G.S., F.R.Met.Soc., for reading the book in manuscript and for making numerous valuable suggestions.

D. E. W.

ST. ALBANS.

September, 1927.

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GENERAL ECONOMIC GEOGRAPHY

CHAPTER I

INTRODUCTORY

Scope of Economic Geography.

ECONOMIC geography, or commercial geography as it is often termed, is the study of the influence of man's physical environment on his activities in obtaining the necessities of life and material goods of all kinds. It treats of commerce as affected by geographical factors, and not only gives a *reasoned* account of how these factors operate in the production, transport and exchange of commodities, but also considers the settlement of lands and the economic problems arising from the distribution of the different races of mankind.

It is concerned with physical geography and with other sciences, such as geology, meteorology, and botany, only in so far as they supply facts which enable the reasons for man's economic activities to be understood. Thus, the facts supplied by meteorology are studied because on climate depends the distribution of vegetation and of animal life; botany and agricultural science reveal the climatic and edaphic requirements of plants; while geology helps in the location of the minerals hidden within the crust of the earth. Such purely physical facts as the heights of mountains and the lengths of rivers are of value to the economic geographer only if they possess an economic significance; as mere geographical facts they do not concern him at all. Thus he is not concerned with the fact that the Himalayas contain the highest mountain in the world, but the great height of the range as a whole is of real significance to him, for it causes the mountains to act as a climatic barrier, having a most important effect on the productive capacity of the whole of India.

Importance of Economic Geography.

It is apparent that a knowledge of economic geography must be of first importance in commerce, for it enables the merchant to discover the best markets for his goods and the sources from which he can obtain, on the most favourable conditions, the

raw materials he requires for their manufacture. Further, it enables him to take precautions against sudden fluctuations in his supply.

In the past, British merchants have suffered considerable loss of trade on account of their ignorance of the precise requirements of their customers; a deficiency which their rivals met by sending representatives to study and report on the actual conditions in the purchasing countries. Confident of their ability to teach the foreigner what was good for him and to create a market for the goods they produced, British merchants were wont to ignore the different conditions which made goods produced for use in Britain unsuitable for use in many other parts of the world. It was a case of "take them or leave them," and it has taken many years to convince the British merchant of the need for studying the reasons for his customers' varied requirements.

The vast strides made during recent years in the development of transport, and means of communication generally, have led to a great widening of markets, and this has greatly enhanced the importance of the subject. During the last hundred years the time-distance between London and Rome has decreased from twelve days to forty-eight hours, or less, and it takes less time to go from London to Berlin to-day than it did to complete the journey from London to Bath in 1824. The distance from London to Berlin is 650 miles and from London to Bath 108 miles, so that for practical purposes the world to-day is only one-sixth its size a century ago. The rapid development of aviation and of wireless telegraphy and telephony bring the countries of the world closer together every year, and our environment, which used to be mainly local in character, is now truly a world-environment. This means that the market for our goods, which a hundred years ago was still largely confined to the home demand, is now a *world market*. What is true of Britain in this respect is true also of the other great industrial nations, and, in consequence, the countries of the world are becoming more and more akin to members of a huge co-operative society, dependent on each other for the complete satisfaction of their wants.

Nature and Causes of Commerce.

Commerce consists of the interchange of commodities between the different peoples of the world, and depends fundamentally on the variations in productive conditions and the consequent variety and multitude of commodities at the disposal of mankind. It develops as communications extend and intercourse with people of other nations fosters new wants and opens out new possibilities in the way of satisfying them. The surplus which remains after a nation has satisfied its requirements is exchanged for the surplus of other nations producing different commodities,

and in this way it is possible, in these days of world transport, for every country to enjoy the products of the whole earth.

The great variety in the commodities available for commerce in different parts of the world is due to three main causes, *viz.* :—

1. Differences in the characteristics of peoples ;
2. Differences in the stage of industrial development of countries ; and
3. Differences in the natural resources of countries.

As these differences are of fundamental importance in commerce, it is necessary to understand how they arise and the relative importance of each class.

DIFFERENCES IN THE CHARACTERISTICS OF PEOPLES.—Peoples of different races often produce distinctive and characteristic goods. For example, the Chinese and Japanese produce lacquer ware, fine carvings in ivory, porcelains and fancy paper goods ; the people of India are renowned for their fine metal work ; the Persians have long been famous for their carpets and rugs ; and the American Indians produce blankets, birch-bark work and basketry. Such differences in production due to racial characteristics, and resulting in specialised products, early led to the exchange of goods and the development of trade. Differences too in the stage of culture cause differences in production and give rise to commerce. Thus the skill and taste of the French have made them famous for artistic products, and Paris has consequently become the centre of the world's trade in luxuries.

One of the earliest causes of trade, this difference of production due to racial characteristics, special skill and culture, is gradually losing its significance with the march of civilisation. Nations are becoming more akin day by day, and in many cases the modern machine-made article is replacing the more artistic product of the native craftsman. The differences in the peoples themselves as a primary basis of commerce, therefore, is tending to diminish, and is, indeed, of comparatively little importance in the world of to-day.

DIFFERENCES IN THE STAGE OF INDUSTRIAL DEVELOPMENT.—Of far greater importance as a cause of trade is the difference in production due to the varying stages of industrial development of countries. This is very largely a matter of density of population, for it will always be found that where there are few people to the square mile the products will differ materially from those of similar regions where a comparatively small area has to support a dense population. The sparse population can live by utilising the free products provided by nature or by producing those raw materials for which little labour and little capital are required. On the other hand, the dense population, having, in comparison, few raw materials per head, must work those

raw materials into a high state of finish in order to increase their value. Thus, in "new" and thinly peopled lands men may make a satisfactory livelihood by such occupations as trapping fur-bearing animals and collecting gums, roots or herbs. Where the population is somewhat larger, lumbering may be carried on in forested regions, while, in open plains, pastoral occupations will prevail until the population increases sufficiently to enable cereals to be cultivated. The products will be exported to the densely populated industrial regions in exchange for manufactured goods.

At present this is the chief basis of trade, and the purchase of manufactures and the payment for them with, for example, grain and animal products will be found wherever these population differences exist and land permits. Thus we obtain food-stuffs and the raw materials of manufacture from the comparatively "new" and thinly peopled countries of the Empire, sending in return manufactured articles of all kinds.

Nevertheless, even this basis of commerce tends to disappear as the countries of the world become more evenly populated and develop similar manufacturing industries. Canada, for instance, has now numerous factories producing many of the articles with which we used to supply her, and many foreign countries, such as the United States and Germany, which used to be important markets for British goods, are now formidable rivals of Britain, having developed the same industries.

Political conditions are, to no small extent, responsible for backward economic conditions and differences in industrial development, for industries cannot prosper where political chaos exists. Security and stability must be assured before merchants and manufacturers will embark in enterprises to any considerable extent and provide the capital necessary for the successful conduct of industry. Where political factors have caused disruption, as in the case of Germany and Italy before the nineteenth century, when innumerable states continually sought each other in war, or of Mexico and Spain to-day, commercial development is inevitably retarded if not completely checked. A nation can either devote herself to industry or indulge in war, but she cannot do both, the pursuit of one interferes with the progress of the other. England was the first country to suffer the pangs and to reap the fruits of the Industrial Revolution, because sound government had rendered the investment of capital in commercial enterprises comparatively free from risk.

DIFFERENCES IN NATURAL RESOURCES.—The differences in the natural resources of countries, resulting from differences in climate, topography and soil, form the one enduring basis of trade between countries. They can never be overcome by man; it will never be possible to produce wheat in the Congo Basin, nor will the British Isles ever be able to grow oranges or bananas, except

under artificial conditions in very small and costly quantities. Trade arising from this cause is of rapidly increasing importance and is undoubtedly the trade of the future. It gives to temperate and tropical lands alike goods required to meet the growing needs of their peoples and which they themselves cannot produce.

The Human Factor in Commerce.

It thus transpires that there are many factors to be taken into consideration in studying the commercial relations of countries, and that man's co-operation is needed before the purely physical, or geographical, factors can exert any marked influence on commerce. Thus, the development of the natural resources of a region will depend on many *human* factors : the existence of settled government, efficient means of transport, the provision of an adequate supply of both capital and labour, the existence of a wide and organised market, and the enterprise and skill of the people. China is perhaps one of the richest of countries as regards mineral wealth and is believed to possess the largest and richest coalfields in the world, yet unsettled political conditions, a bigoted policy with regard to trade with foreigners, and lack of adequate means of transport have hitherto militated against the proper exploitation of these valuable resources. Many other instances of this control by the human factor might be given. For instance, Venezuela has all the physical conditions of a great meat-producing region : in the interior there are large areas of good cattle country, the climate is suitable, and the great meat markets of the world are close at hand. Nevertheless, the absence of capital and of adequate means of transport have greatly restricted her development in this respect. Again, Western Siberia, owing to the cheapness and greater fertility of the land, could produce grain even more cheaply than the "blacklands" of European Russia. But distances are so great between the chief agricultural centres and the European markets that Siberian farmers have had to make their money crop take the form of dairy produce, which is better able to stand the high freight charges.

It thus becomes evident that the unaided action of neither the geographical factors nor the human factors explains why certain commodities are produced on a large scale in some countries and only on a small scale, if at all, in others. Of this, only the *interaction* of these two sets of factors can afford a complete explanation, as the following illustration will show. The tea plant can be grown, as far as its *climatic* requirements are concerned, throughout the warm forest regions of the world, and there are many lands where suitable climatic conditions prevail. Such are the south-east United States, the Amazon and Congo Basins, and much of the monsoon lands of south-eastern Asia. There is, however, an important requirement of the tea

plant which at once excludes it from low-lying, well-watered regions such as the Amazon and Congo Basins, for, although it requires plenty of moisture, it is easily damaged by water collecting round its roots, and consequently must be grown on hill slopes, which provide good natural drainage.

But, even when these two conditions have been taken into consideration, it is still impossible to explain, *on purely physical grounds*, the absence of tea cultivation from North America, for the conditions on the slopes of the Appalachian Mountains, in the south-east, are quite as suited to the tea plant as those of China within similar latitudes. Yet the tea production of China is enormous while the countries of North America have to import every ounce they consume. It is the working of the *human factor* which supplies the explanation. Tea has to go through many processes before it finally reaches the consumer, many of them extremely costly, and it is evident that some one must work for very low wages to enable the product to be marketed at the ordinary price of about half-a-crown a pound. This is the native who picks the leaves from the plant. It is clear, therefore, that tea cultivation can be carried on successfully only where there is abundant *cheap* labour. But even this does not explain the absence of tea cultivation from the south-east United States, for it may well be pointed out that negro labour, of which there is plenty to be had in that region, is cheap. The final consideration concerns the *quality* of the labour supply. Tea picking is essentially work for neat fingers, and the negro is not naturally particularly neat. On the other hand, the Sinhalese, Tamils and Chinese of the monsoon lands are noted for this characteristic, and, further, they have the advantage of long training in the delicacy of manipulation required. It is this necessity for cheap, *neat* labour which has hitherto confined tea cultivation to the lands of eastern Asia, and the modern production in such regions as Nyasaland and Natal is made possible only by the supply of Asiatic labour.

The foregoing illustrations make it evident that, while without geographical advantages a country can never become economically great, the possession of such advantages is by no means conclusive evidence that its economic possibilities will be realised.

CHAPTER II

GEOGRAPHICAL FACTORS INFLUENCING COMMERCE

CLIMATE

OF the geographical factors influencing commerce, the most important is climate, *i.e.*, average weather conditions. Subject to the modification of its action by human factors, in combination with other physical conditions it accounts for the differences in the vegetable and animal products of countries and, to a large extent, determines the mode of life of the inhabitants, even having an effect on the production of minerals. It is, therefore, necessary to consider climate at some length and to obtain a clear understanding of the action of the main climatic factors.

Latitude.

Latitude, *i.e.*, distance from the equator, is the chief of the geographical factors affecting climate, as on it depends the angle of incidence of the sun's rays—*i.e.*, the angle at which they strike the surface of the earth. In considering the effect of latitude it is necessary to bear in mind three important points. First, it must be remembered that we live, as it were, at the bottom of a sea of air; second, that, owing to the inclination of the earth's axis at an angle of $23\frac{1}{2}^{\circ}$ to the plane in which it moves round the sun, the sun is never overhead except between latitudes $23\frac{1}{2}^{\circ}$ N. and $23\frac{1}{2}^{\circ}$ S., the Tropics of Cancer and Capricorn respectively; and third, that while the sun's rays lose a great deal of their heat in passing through it, the atmosphere is warmed only very slightly in this way, its warmth being derived mainly from the heated surface of the earth. It should be borne in mind also that the sun is so far distant from the earth compared with the size of the latter, that the sun's rays may be regarded as reaching the earth in parallel lines.

The result of these conditions is that as places within the tropics (*i.e.*, between $23\frac{1}{2}^{\circ}$ N. and $23\frac{1}{2}^{\circ}$ S.) receive the sun's rays more directly than places nearer the Poles, the rays are concentrated on a smaller area, heating that area more intensely, and, moreover, as they have less atmosphere to pass through,

they suffer less loss of heat before reaching the earth. (See Fig. 1.) Tropical regions thus experience a much higher mean temperature than any other part of the earth.

But there is another important point to be considered with regard to latitude. It is necessary to take into consideration not only the degree of intensity of the sun-force acting on the surface of the earth, but also the length of time during which the sun is shining on any particular region. Owing to the inclination of the earth's axis, at the equator the sun appears above the horizon for roughly twelve hours a day throughout the year, but from the equator to the Poles (*i.e.*, as higher latitudes are approached) the summer day gradually becomes longer and the winter day shorter until at the Arctic and Antarctic Circles,

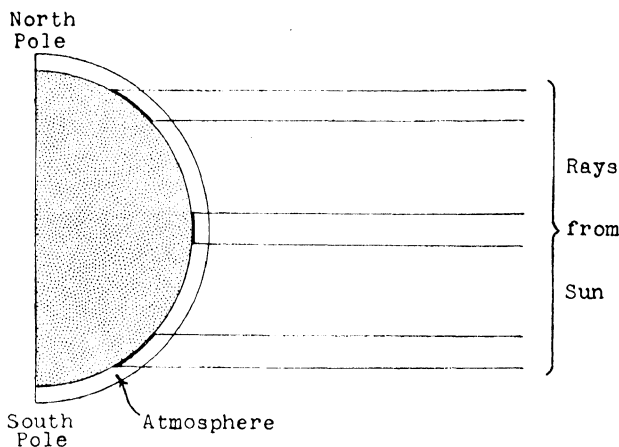


FIG. 1.—THE EFFECT OF LATITUDE ON INSOLATION.

the sun remains above the horizon continuously for twenty-four hours at midsummer, and at midwinter is not seen at all for a similar length of time. Within the Arctic and Antarctic Circles, days of twenty-four hours are unknown, and the length of the summer "day"—*i.e.*, the period during which the sun remains above the horizon—varies from twenty-four hours at the Circles to six months at the Poles. The lack of intensity of the sun-force in higher latitudes is, therefore, to some extent counter-balanced by the greater continuous length of time during which the sun is shining, and the *range* of temperature experienced during the year increases with increase in latitude. Thus, at Para, in latitude 1° S., the difference between the temperature in January and July is only 1° Fahrenheit, while at Verkhoyansk, in latitude 67° N., the difference is 120° F.

The world may be divided according to latitude into five zones (Fig. 2):—

THE TORRID ZONE, comprising the area between the Tropics of Cancer and Capricorn, *i.e.*, between $23\frac{1}{2}^{\circ}$ N. and $23\frac{1}{2}^{\circ}$ S. Here the sun is nearly overhead all the year round, and there are practically no seasonal differences, either of temperature or length of day and night.

THE TEMPERATE ZONES, comprising the area from the Tropic to the limit of the Polar regions in each hemisphere, *i.e.*, $23\frac{1}{2}^{\circ}$ N.

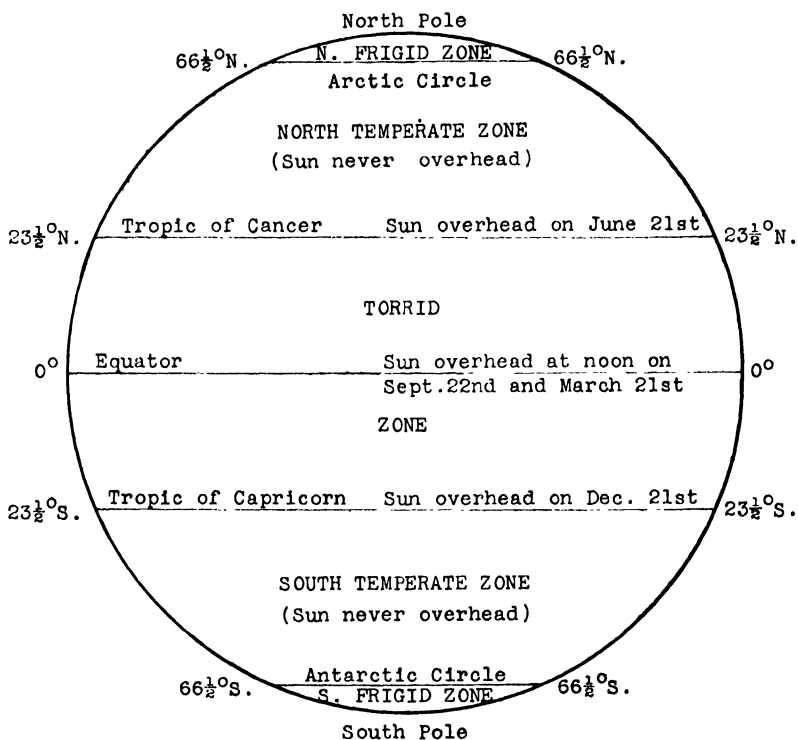


FIG. 2.—THE ZONES OF THE EARTH.

— $66\frac{1}{2}^{\circ}$ N. and $23\frac{1}{2}^{\circ}$ S.— $66\frac{1}{2}^{\circ}$ S. In these zones the sun is never quite overhead, and the difference between the lengths of the summer and winter days increases rapidly as the Poles are approached. From their tropical limits polewards, there is consequently an increasing difference between summer and winter conditions, and considerable variations in climate are experienced.

The forty-fifth parallel of latitude is often selected as a convenient line for the division of each of these zones into a Warm Temperate Zone and a Cool Temperate Zone.

THE FRIGID ZONES, comprising the area north of the Arctic Circle ($66\frac{1}{2}^{\circ}$ N.) and south of the Antarctic Circle ($66\frac{1}{2}^{\circ}$ S.). In these zones the length of the "day" varies from twenty-four hours at the Circles to six months at the Poles, and the great difference between the time during which the sun shines in summer and in winter results in a very great difference between summer and winter temperature conditions.

Altitude.

As the atmosphere is dependent for its warmth on the degree to which the surface of the earth is heated by the sun, it will be apparent that temperature will drop with increase in distance from the earth's surface and that the greater the altitude of a place the lower will be the temperature experienced. If this were not so there would be no such thing as a snow-capped mountain. As a matter of fact, there is a *decrease* of 1° F. in temperature for, roughly, every 300 feet of *increase* in altitude. Altitude, therefore, modifies the heat of places within the tropics, making them healthy and habitable by the white man, and, in the temperate zones, renders places bleak and inhospitable or even completely uninhabitable and of no economic value. Thus, while Para, situated at sea-level 1° south of the equator, has a July temperature of 81° F., Quito, actually on the equator but at an altitude of 9,350 feet, has a temperature for the same month of 54° F. In the temperate zones, regions such as the highlands of Scotland are bleak and of little economic value chiefly owing to the effect of altitude.

Slope of the Country.

The general slope of the land has, like altitude, either a modifying or an emphasising action on the effect of latitude. It has been shown that in low latitudes, *i.e.*, near the equator, the sun's rays strike the earth almost at right angles, thus concentrating their heat on a smaller area than in higher latitudes, where they fall more obliquely and, consequently, have a larger area to heat. If the surface of the land slopes towards the sun, the obliquity of the rays will be counteracted, and the area to be heated by a given number of rays will decrease in size. On the other hand, if the surface slopes away from the sun, the obliquity of the rays will be emphasised, and the area to be heated will increase. (See Fig. 3.) The effect of slope, therefore, is to decrease or increase the temperature of regions according to whether the surface slopes towards or away from the sun. In the northern hemisphere, north of the Tropic of Cancer, *i.e.*, in regions where the sun always lies to the south, slopes facing south will be warmer than level country, and level country will be warmer than slopes facing north. The reverse conditions, of course, apply in the southern hemisphere. A good example of the effect of slope is

found in the Plain of Lombardy, Northern Italy, the northern part of which slopes to the south and experiences a milder climate than the southern part, which slopes to the north.

Distance from the Sea.

The distribution of land and water over the surface of the earth is of very great importance in its climatic effects. Owing to the fact that water both heats and cools more slowly than land, places near the sea have an equable climate in marked contrast to the extremes of heat and cold experienced by places

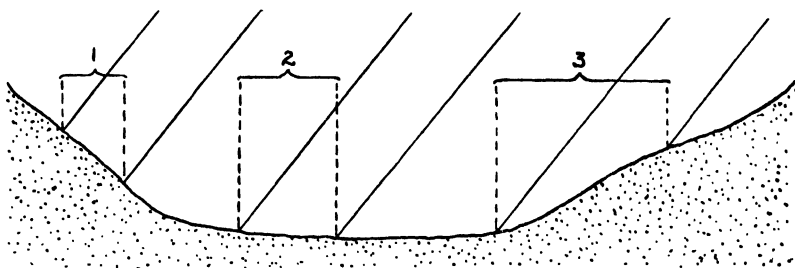


FIG. 3.—EQUAL AMOUNTS OF SUNSHINE FALL ON AREAS 1, 2 AND 3, BUT AS THE DEGREE OF CONCENTRATION OF THE RAYS VARIES WITH THE SLOPE OF THE COUNTRY, THE FIRST AREA RECEIVES MOST HEAT AND THE THIRD LEAST.

situated in the interior of land masses; especially is this the case in the temperate regions. Semipalatinsk, situated in the interior of Eurasia in latitude 50° N., has a January temperature of 0° F., and a July temperature of 72° F., while Ventnor, in the Isle of Wight, in exactly the same latitude, has a January temperature of 41° F., and a July temperature of 62° F. The sea, and, to a less extent, any other large stretch of water, such as the Great Lakes of North America, has thus a direct tempering effect on the climate of a region. It not only tempers the heat of summer, but greatly modifies the cold of winter. Further, as the sea is the great source of moisture, it has an additional and indirect climatic effect, in that rainfall tends to decrease with distance from the sea. Thus, to use the same example—by no means the most striking—the mean annual rainfall is seven inches at Semipalatinsk while at Ventnor it is thirty.

Prevailing Winds.

The winds which blow over a country have an extremely important effect on its climate, for they are carriers of both heat and moisture. The *laws of wind* should therefore be thoroughly understood, and these may be stated as follows:—

(1) Air flows from regions of higher to regions of lower atmospheric pressure.

(2) From high pressure regions, air flows *downwards* to the surface of the earth and then *outwards* towards low pressure regions.

(3) Into low pressure regions air flows *inwards* and then *upwards* from the surface of the earth.

(4) Owing to the rotation of the earth, winds are deflected to the *right* in the *northern* hemisphere and to the *left* in the *southern*.

It is unnecessary here to discuss the causes of winds—to do so would be to encroach on the realm of physical geography—but

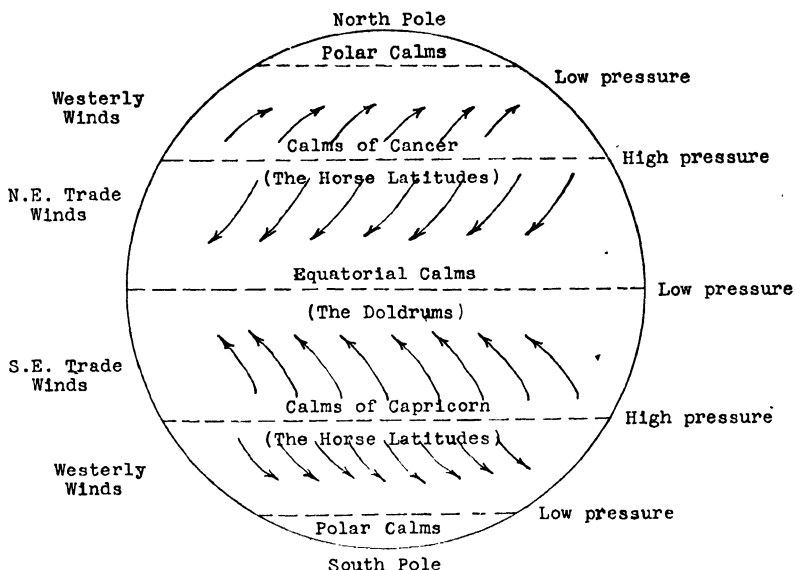


FIG. 4.—DIAGRAMMATIC REPRESENTATION OF THE PERMANENT WINDS AND CALMS OF THE EARTH.

it may be pointed out that the two great factors in determining the distribution of high and low pressure systems are the rotation of the earth and the inequalities in the heating of its surface, due to the combined effect of latitude and the different rates of absorption of heat by land and water. The effect of latitude and the rotation of the earth is seen in the presence of certain well-defined high and low pressure belts which give rise to permanent wind systems. (See Fig. 4.) These belts of pressure and wind systems are not, however, continuous round the world, for the alternation of masses of land and water, which possess unequal heating capacities, give rise to great modifications in the distribution of pressure and, therefore, in the direction and force of the winds. (Fig. 5.)

Winds influence climate chiefly through their effect on rainfall. One of the chief constituents of the atmosphere is water-vapour, a gaseous form of water which is invisible until condensation takes place and converts it into mist, clouds, rain, hail or snow. Now as air becomes warmer its capacity for holding water-vapour increases; and as it cools so does its moisture-carrying capacity decrease. Thus, if warm air con-

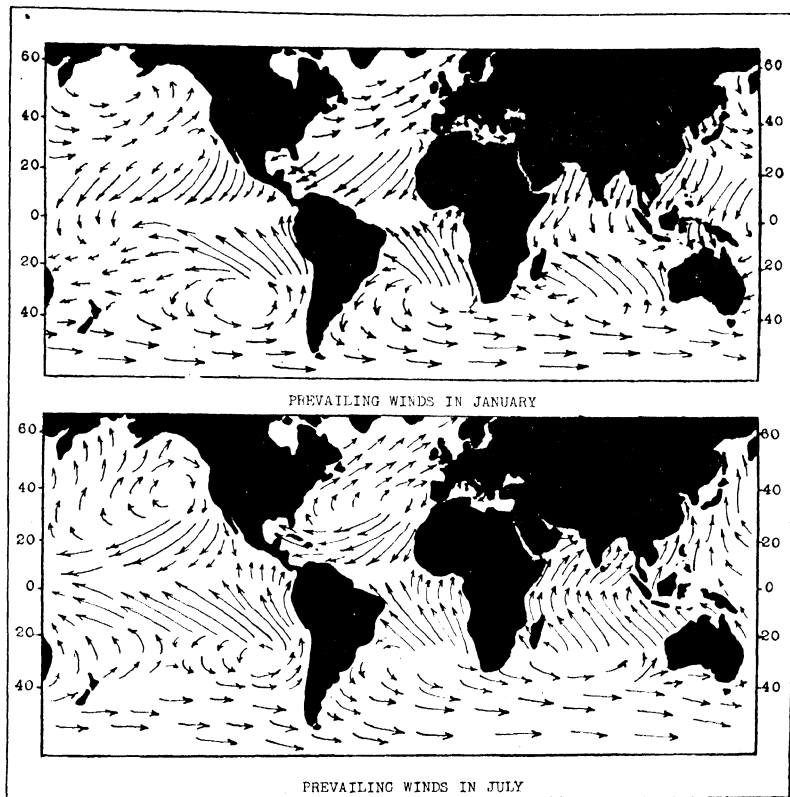


FIG. 5.

taining sufficient water-vapour is cooled it will be rendered incapable of retaining all its moisture, and the surplus will probably descend as rain.

This cooling can be brought about in several ways. The air may be cooled by contact with a cold land surface or by mixing with colder air—as when the warm, moist air from over the Gulf Stream mixes with the cold air over the Labrador Current, causing the frequent fogs off Newfoundland—or even by passing from lower to higher latitudes, *i.e.*, from warmer to cooler regions. All these are important, but the chief cause of

the cooling of air is *expansion*. If the air be suddenly released from an inflated football bladder, in which it has been compressed, it will be found to be cold. This is due to the sudden expansion of the air on issuing from the bladder. Conversely, when air is compressed it is warmed—anyone who has felt a bicycle pump become uncomfortably hot, due to the forcing of the air into the tube, will realise this. Now when air rises there is less atmosphere above to compress it and it expands and cools. Thus, in the equatorial low pressure belt, a region of rising air, there is constant rainfall, while in the tropical high pressure belts, regions of descending air, there is little or no rainfall.

It will be readily appreciated that winds blowing *from warmer to colder* regions will increase the temperature of those regions, and that if in their course they pass over the sea they will collect moisture which will be deposited as rain. Thus the mild, moist climate of the British Isles is due largely to the prevalent south-westerly winds which blow from a relatively warm ocean. On the other hand, winds which blow *from colder to warmer* regions, especially if they have crossed great land masses in their course, produce reverse effects; for their moisture-carrying capacity increases and, in the latter case, they do not bring with them the equalising influences of the sea. Many examples of this are to be found in countries influenced by the Trade Winds.

From the above account it will be realised that a knowledge of the prevailing winds of the different parts of the earth is of great importance to the student of economic geography. Without it he will be unable to understand the varying types of climate and, incidentally, the varying economic activities of man in the different regions of the world.

THE TRADE WINDS, so called because of their great importance to merchant ships before the advent of the steamer, are the winds that blow from the high pressure belts at the Tropics towards the equatorial low pressure belt. Owing to the rotation of the earth they are deflected and blow from the north-east in the northern hemisphere, where they are known as the North-East Trade Winds, and from the south-east in the southern hemisphere, the South-East Trade Winds. As these winds originate in descending air currents they are dry at the outset, and as they blow from cooler to warmer regions this dryness is accentuated. Thus where they blow across the land, instead of causing rainfall, they absorb moisture from the regions over which they pass. As a result of this there will be a hot desert belt on either side of the equator somewhere about the latitude of the Tropics of Cancer and Capricorn, wherever the land surface over which the Trade Winds blow is wide enough to permit their drying effect to make itself felt. Such tropical deserts are found in North Africa, South Africa, Australia, S.E. Asia, Mexico, the

southern U.S.A., and South America. And it may be well to point out here, with regard to hot deserts, that the arid conditions are due entirely to lack of rainfall and in no way to any inherent sterility of the soil; indeed, where irrigation is practised, they prove to be exceedingly fertile regions, as has been amply proved in Egypt and India.

Where the Trade Winds reach land after having passed over the ocean, they arrive abundantly charged with moisture, and, if they then have to pass over high land, cause a plentiful rainfall. Regions so affected are the south-east of Africa, including Madagascar, the east and south-east of Australia, the south-east of Brazil, the north-east, or Guiana, coast of South America, and the West Indies and Central America.

Between the wind systems of the North-East and South-East Trades is the equatorial belt of high temperature and low atmospheric pressure; a region of ascending air currents saturated with moisture, the cooling of which results in the heavy rainfall of the equatorial lands. This belt of heavy rainfall and great heat moves north and south with the sun—as indeed do all the belts of high and low atmospheric pressure and their accompanying wind systems—and coincides with the equator only at the equinoxes, periods when the sun is overhead for twelve hours each day, in March and September. The effect of this, as far as the Torrid Zone is concerned, is that countries on or near the equator, *e.g.*, the Amazon and Congo Basins, the northern lowlands of the Guinea Coast, and the equatorial lowlands of Malaya, have two fairly distinct rainy seasons, though there is no really dry season, while as the Tropics are approached (where the sun reaches its northern and southern limits in relation to the earth) the interval of time between these two wet seasons gradually decreases until in the latitude of the Tropics they merge into one period of rains occurring in the summer. Thus, much of Nigeria, the Upper Guinea lands, the southern part of the Congo basin, the north coast of South America, and northern Australia have a well-marked dry season of five or six months.

THE WESTERLY WINDS blow from the polar limits of the tropical high pressure belts towards the low pressure areas situated on the fringes of the polar regions—*i.e.*, between latitudes 40° and 60° in both the northern and the southern hemispheres. The rotation of the earth again makes itself felt, and in the northern hemisphere the winds blow from the south-west. In the southern hemisphere, where, owing to the small amount of land, the deflection is somewhat more marked than it is in the northern hemisphere, the winds are almost westerly throughout the year, and, on account of their strength, the latitudes in which they are most prevalent are known as the Roaring Forties. Between latitudes 40° and 60° , therefore, in contrast with conditions in

the Trade Wind zones, the west coasts of the land masses are wetter and milder than the eastern. Further, on account of the prevalence of *cyclones*, or *depressions*, in these latitudes, *i.e.*, centres of low pressure into which the winds blow from all directions with a circular motion, and, rising, give up their moisture as rain, the interiors and even the east coasts of the continents receive considerable rainfall. There are consequently no deserts in the regions of the westerly winds. The fierce rotating storms occurring in the Trade Wind belt, which are known by different names in different parts of the world (*e.g.*, "hurricanes" in the West Indies and "typhoons" in the China seas) are much more intense depressions than those of the westerly wind belts and cover a much smaller area.

The parts of the world coming under the influence of the Westerlies lie within the two temperate zones. As the wind systems move north and south with the apparent movement of the sun, most of the warm temperate zone in each hemisphere is occupied by the Trade Wind belt in summer, while, in winter, when the wind systems have moved south with the sun (north, in the case of the southern hemisphere), lands between about 35° and 45° come within the influence of the Westerly winds. Thus these regions experience hot, dry summers and mild, wet winters; they include the lands bordering the Mediterranean Sea—from which this type of climate, the Mediterranean type, takes its name—and the west coasts of continents in similar latitudes.

The opposite sides of the continents in similar latitudes receive most of their rains in summer, during the prevalence of the Trade Winds, and experience comparatively dry winters. Natal and the east of Australia (the coast of New South Wales) both experience this type of climate.

MONSOONS.—While the two wind systems described above are the outcome chiefly of the combined effect of latitude and the rotation of the earth, there are certain winds, such as the land and sea breezes experienced on our coasts, caused by the unequal rates of heating and cooling of land and water. As has been shown, a heated surface causes the air above it to become warm and light, thus setting up low atmospheric pressure conditions, while a cold surface causes the air above it to become cold and heavy, resulting in high pressure conditions. It has also been shown that land both heats and cools more quickly than water. The result of this is that on a warm summer day the land is much warmer than the sea and consequently experiences relatively low pressure conditions, and a sea breeze ensues. At night, however, the land cools more rapidly than the sea, the pressure conditions are reversed, and a land breeze is the result. Thus during settled weather there will be a breeze from the sea by day and one from the land by night. (Fig. 6.) While these land and sea breezes

are of comparatively little importance in themselves, they are helpful in explaining the monsoons, or seasonal winds, for *these are merely land and sea breezes on a large scale*, summer and winter taking the place of day and night respectively.

Monsoons, though experienced in other parts of the world on the tropical shores of large land masses, are typical of south-eastern Asia and northern Australia. In both cases the intense heating of the land during the summer sets up low pressure conditions, and air is drawn in from over the cooler seas. In the winter the land surfaces experience relatively high pressure conditions, and

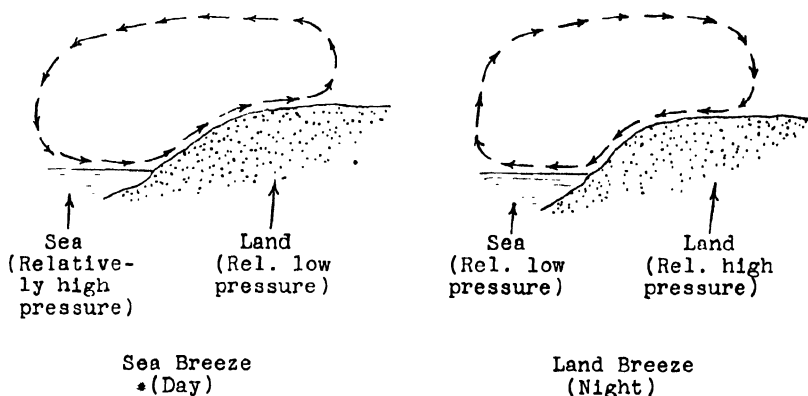


FIG. 6.—LAND AND SEA BREEZES.

the air movement is from the land to the sea. Thus, in general, the monsoon lands may be said to experience a hot, wet summer and a dry winter, the temperature experienced at this season depending on local conditions.

Position of Mountain Ranges.

The chief climatic effect of mountain ranges or other high land, such as the edge of a plateau, is on rainfall. If mountains lie across the path of moisture-laden winds the air will be forced to rise in order to cross them, and the consequent expansion and cooling of the air will result in the condensation of the water-vapour it contains. Thus the coast ranges of British Columbia cause the coast of that province to experience an abundant rainfall, and the Southern Alps have a similar effect on the rainfall of the western side of New Zealand (South Island). When the wind has crossed the mountain range, however, it is forced to descend to the plains on the leeward side, and the air is compressed. This warms it and increases its moisture-bearing capacity, with the result that the moisture left in the air after the condensation on the windward side has taken place becomes only a very small proportion of the amount it is capable of containing, and the

wind that reaches the plains on the leeward side is relatively warm and dry. (Fig 7.)

In the two cases mentioned above, therefore, while the windward side of the mountains has a heavy rainfall, the leeward side is comparatively dry. Mountains are thus spoken of as casting a "rain shadow," and the warm drying winds blowing on their landward side have frequently a beneficial effect. For instance, the winds blowing down to the east from the Rocky Mountains, known as the *Chinook Winds*, which are most prevalent in winter and spring, greatly modify the cold of winter, often causing a rapid disappearance of the snow over a comparatively wide area. Parts of the high plains in Alberta are thus rendered available for stock-raising much earlier in the year than would otherwise be the case.

Another important climatic effect of mountain ranges is well illustrated by the Himalayas. These mountains have an average

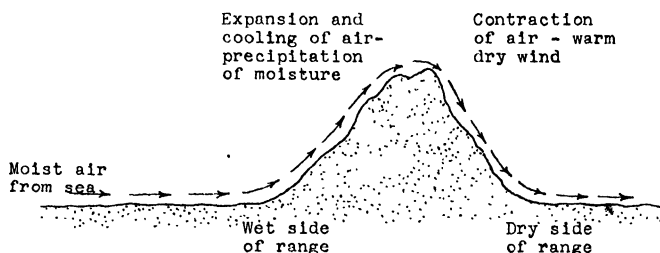


FIG. 7.—THE EFFECT OF MOUNTAINS ON RAINFALL.

height of some three miles, and extend for about 1,500 miles across the north of India. Were it not for them the winter climate of that country, instead of being mild, would be bitterly cold, and agricultural operations, which now extend over the whole year, would have to be discontinued during the winter months. The Himalayas act as a climatic barrier sheltering India from the cold winds which sweep over Tibet at this season of the year.

This is the most outstanding example of the effect of mountains as climatic barriers, but the Alps have a similar effect in sheltering the Mediterranean lands and rendering their winter warm, while the climate experienced to the north is cold and rigorous. In North America the absence of such a barrier in the north makes the whole continent liable to experience sudden changes of temperature from mild to bitterly cold, as a result of a sudden veering of the wind from south to north. These cold north winds—known as "cold waves"—are felt as far south as the Gulf of Mexico and the south-east coast. Their effect in these regions is sometimes very serious, particularly in Florida, where the season's orange crop is occasionally destroyed by frost.

Ocean Currents.

Ocean currents are largely the result of winds driving the surface waters of the ocean before them, and, consequently, they conform with the direction of the prevailing winds of the earth as far as the distribution of land will permit of their doing so. Thus, in both the Atlantic and the Pacific the steady Trade Winds drive the water on either side of the equator in a westerly direction. On reaching the eastern coasts it flows north and south into the regions of the Westerly Winds, and is then driven across the ocean again and so reaches the cool temperate zone.

It will be seen that this circulation causes a transference of warm water from the equatorial regions to the cooler seas of higher latitudes. In the North Atlantic, for instance, the warm water of the North Equatorial Current, together with part of that

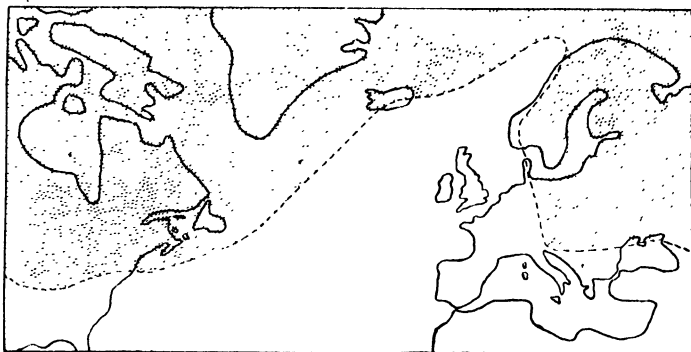


FIG. 8.—THE WINTER GULF OF WARMTH. THE AREA SHADED HAS AN AVERAGE JANUARY TEMPERATURE BELOW FREEZING-POINT.

of the South Equatorial Current, flows towards the West Indies. Some of the water skirts the outer shores of the islands, but the greater part streams through into the Caribbean Sea and thence into the Gulf of Mexico. Leaving the Gulf by the Florida Channel it unites with the branch which passed outside the West Indies and forms the Gulf Stream—the best known of all ocean currents. The Gulf Stream—the temperature of whose surface waters at this stage is about 80° F.—flows along the coast of North America as far as Cape Hatteras and then passes out into the ocean. It loses its character as a well-defined current in mid-Atlantic, but its warm surface waters continue to travel eastwards under the influence of the south-westerly winds, as the *North Atlantic Drift*, until they reach the coasts of the British Isles and Norway—some, indeed, passing into the Arctic Ocean, through the channels lying between Iceland, Greenland, and the coasts of the British Isles and Norway. It is to the influence of this drift and of the winds blowing over it that the British Isles

owe their mild winters, for they are situated in a gulf of warmth stretching into regions which, according to their latitude, should be cold and inhospitable. (Fig 8.)

In addition to warm currents flowing towards the polar regions there are cold currents flowing towards the equatorial regions. Their direct effect, however, on the climate of the countries whose shores they wash is small as compared with that of warm currents, for they always flow along coasts experiencing off-shore winds. Thus it is only when weather conditions are sufficiently settled to allow of land and sea breezes making themselves felt that their influence can be carried inland. Their chief effects on the climate of countries are indirect; they are a frequent cause of fogs, as off the coast of Newfoundland, and, in temperate regions, often cause the coasts they wash to be ice-bound during the winter. Thus, owing to the effect of the Labrador Current the Gulf of St. Lawrence is usually closed by ice from December to April each year.

These, then, are the main factors responsible for the climate of any place. Any or all of them may be in operation at the same time, modifying or supplementing each other and causing unexpected variations such as those caused in the climate of Norway by the North Atlantic Drift. Norway and Sweden lie in the same latitudes and together form a narrow peninsula, and yet the ports of the former are never ice-bound, whereas the ports of the latter, *i.e.*, the ports of the Baltic, are closed for part of the year.

OTHER GEOGRAPHICAL FACTORS

Position and Physical Features.

Apart altogether from their effect on climate, however, the position and physical features of countries play a most important part in promoting or retarding commercial relations. A country may be so situated that it has special advantages for conducting extensive commerce; it may be centrally placed, with easy means of communication in all directions, among nations having differing products; and it may possess well-marked natural frontiers which render it free from undue fear of attack and at liberty to develop its natural resources to the best advantage. On the other hand, a country may be so unfavourably situated with regard to other countries that its commerce is seriously handicapped or never develops at all.

A maritime situation has always proved of great value in enabling a country to develop its commerce, especially where the sea washing the shores is a shallow sea within temperate latitudes, for it is in such waters that the most valuable fisheries of the world are found. The sea has had a powerful influence in other ways, however. It invited man to venture forth and

discover new lands and, at the same time, provided the cheapest possible means of transport for carrying on trade with those lands once they had been settled and developed. It has, in the case of Britain, resulted in the creation of a race of seamen who have gone forth and colonised new lands the world over, gradually building up an empire which has grown into a great commonwealth of nations. As a result, the British mercantile marine is the largest in the world, and Britain stands first among commercial nations.

Though maritime situation is of such great importance as regards world trade, a country disadvantageously situated in this respect may develop important industries and build up a considerable commerce if the neighbouring countries are thickly populated. Of all inaccessible countries, Switzerland probably is without parallel, and yet she has built up a very satisfactory commercial connection because of her excellent situation in the midst of the great industrial nations of Germany, Austria, France, and Italy, all of which offer themselves as markets for her characteristic products.

LAKES, if they are sufficiently large, have the same effects, in miniature, as the sea—influencing climate and products, providing food, a cheap means of transport and, in some cases, acting as political frontiers. In addition, they frequently serve as filters for rivers flowing through them, of which they also control the flow. Thus they not only frequently prevent the formation of sand-bars or deltas at the mouths of rivers, but also minimise the chances of flooding by enabling the flood water derived from the snows and glaciers of mountains to be spread over a large surface. Then again, lakes—both natural and artificial—are used as reservoirs for the supply of drinking water, and for storing water for canals or for use in electric power stations.

RIVERS early achieved importance, for they served as guides for moving tribes and the level ground on either side offered great advantages as sites for settlements, the river providing food and drink and also facilitating intercourse. To-day, where they are navigable, they provide a cheap and easy highway for traffic, and their valleys are of great value in providing a natural route for railways and roads. Where the current is swift or where waterfalls occur, they form valuable sources of hydro-electric power. They provide supplies of drinking water, and unless the current has cut a gorge, thus sinking the river below the level of the surrounding country, are extremely valuable, in regions where the rainfall is scanty, for irrigation purposes.

THE RELIEF OF THE LAND, also, plays a very important part in assisting or hindering commerce. Thus *mountains* have marked effects quite apart from their influence on climate. In company with other natural obstacles such as *swamps* and

deserts, they may help to guard a country from invasion, and thus supply that security without which commerce is impossible ; at the same time they may hinder communication which would be to the advantage of that country from the point of view of natural development and commercial relations. In this way, though they help the development of a country in its early history by so isolating it that it has every chance of growing into a national unit, in its more advanced state they may have an adverse effect in preventing, or, at least, rendering difficult, that communication with other countries without which its economic development cannot proceed. Thus, where natural passes exist they are of great importance and are utilised for the construction of roads and railways.

Further, mountains perform an exceedingly important function in giving rise to rivers by causing condensation of water-vapour. As has been seen, where they lie outside the equatorial regions and are sufficiently high to rob the winds crossing them of their moisture they have a wet and a dry side. This causes them to be well forested on one, the wet, side and comparatively bare of trees but covered with grass on the other, and, in conjunction with the effect of altitude, leads to a variety of vegetable and animal products, and, consequently, of occupations, in a comparatively small area. This variety of products is increased by the presence of mineral deposits. The greater part of these, especially those of metallic ores, were formed deep down in the crust of the earth. It is consequently chiefly in regions where the deep-seated rocks have been folded up into mountain ranges and then exposed on the surface that these minerals are most accessible and where mining industries will most frequently occur. Minerals are exposed chiefly on the wet sides of mountains owing to the action of the weather in wearing away the rocks.

PLAINS contrast strongly with mountainous regions in the lack of variety in their products. Where the climate is suitable they are devoted mainly to agricultural and pastoral industries, the treeless nature of the level land being particularly favourable to large-scale agricultural operations.

NATURAL REGIONS

The many geographical factors affecting commerce form numerous different combinations and reinforce each other in varying degrees, according to local conditions, and it will be obvious that economic activities must vary very much throughout the world. A careful study of the operation of these factors, however, shows that it is possible to divide the world into a number of *natural regions* ; regions possessing certain common characteristics as regards relief, climate, and natural vegetable

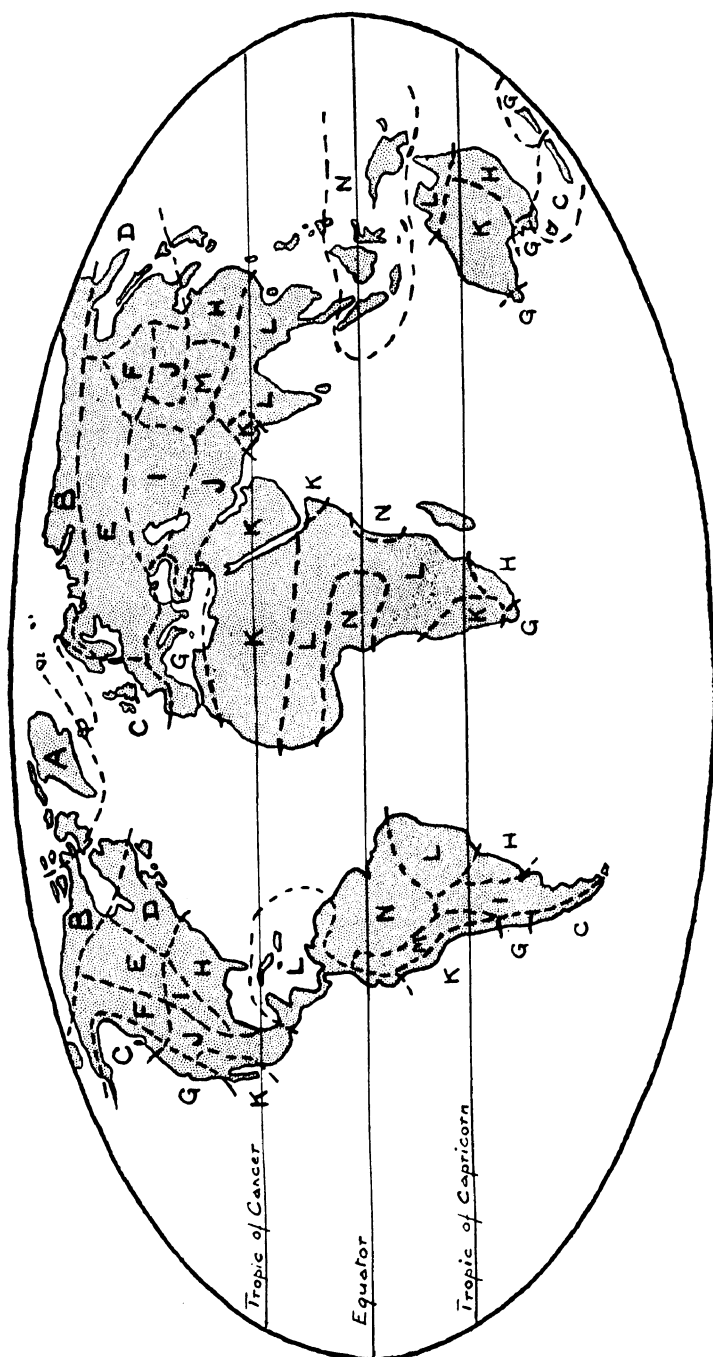


FIG. 9.—THE MAJOR NATURAL REGIONS OF THE WORLD.

and animal products, and which, therefore, afford similar opportunities for agricultural and pastoral production and for commercial development generally. Lands situated in widely separated parts of the world may thus form part of one natural region. The boundaries of such regions, determined, of course, by purely geographical factors, are not clearly and definitely marked, as are those of regions separated by political frontiers, and natural regions merge gradually into each other.

The study of natural regions is of great practical importance, for it enables man to cultivate the products naturally suited to different lands. For example, it was found that Malaya formed part of the natural region to which those parts of Brazil producing the best wild rubber belonged. This led to the cultivation of rubber in plantations in the Malay Peninsula with such success that this is now the greatest rubber-growing region in the world, and the British Empire produces something like two-thirds of the world's supply.

Regions possessing sufficient features in common to warrant their being grouped in one broad type of natural region are indicated in the map (Fig. 9) by a single letter of the alphabet. The lines separating the various regions follow the approximate central lines of the transition areas between them.

Polar Regions.

A. *Ice-Cap Type*.—Lands of this type, perpetually covered with snow and ice, are of little economic importance.

B. *The Tundra Type* includes the lowlands bordering the Arctic Ocean and extends completely across the mainland of North America and Eurasia. It lies for the most part within the Arctic Circle. In winter, tundra lands are really cold deserts, as frost prevails for about eight months of the year, and there is little snow, and, of course, no rain. The ground is permanently frozen at a depth of a few feet, but in the short summer the surface thaws and the soil is flooded with water and becomes marshy. The vegetation consists of mosses and lichens and small shrubs and berry-bearing bushes such as the cranberry. During the summer, daylight is almost continuous, and in favoured places brilliant flowers burst into life in July, completely transforming an otherwise bleak desert into a land of beauty and colour. At this time of the year there is abundant vegetation, which springs up and grows in a very short period, and is capable of supporting the many valuable fur-bearing animals found in the region at this season.

Stefansson, the famous Canadian explorer who has done so much to reveal the possibilities of the north of Canada, writes, "the Arctic grass-lands have caribou (the American reindeer) in herds of tens of thousands and sometimes hundreds of thousands to a single herd, with less numbers of musk oxen here and there.

Wolves that feed on the caribou go singly and in packs of ten or less, and their aggregate numbers on the Arctic prairies of the two hemispheres must be well in the tens of thousands. There are the polar foxes, both white and blue, that feed in summer on the unbelievable swarms of lemmings that also form the food of hundreds of thousands of owls and hawks and gulls. There are the goose and brant and swan and crane and loon and various species of duck. The ground in the moulting season in some islands, such as Banks Island, three or four hundred miles north of the Arctic Circle, is literally white with their moulted feathers a little later in the season when the birds are gone. When you add to this picture the bumble bees, blue-bottle flies, and abundant insect life, of which the clouds of mosquitoes form the most impressive and least tolerable part, you get a picture of a country that in summer is not without life."¹

It is noteworthy that Stefansson regards the Canadian tundras as a valuable future source of meat supply. At present, however, the region is of little economic importance except in certain instances, *e.g.*, gold mining is important in the Yukon, and coal is obtained in considerable quantities from the island of Spitzbergen.

Cool Temperate Regions.

C. *The Western Cool Temperate Margins of the Continents.*—The lands of this type occur above latitude 45° and include N.W. Europe, N.W. North America, S.W. South America, Tasmania and South Island, New Zealand. The winds are chiefly westerly, blowing from over wide expanses of ocean, and rainfall is adequate and evenly distributed throughout the year. The vegetation is of the forest or forest-clearing type, and the soils are for the most part naturally good. The range of temperature between summer and winter is nowhere great, and it is rarely the case that economic activities in the open have to be suspended on account of climatic causes. Also, the ports remain open all the year round and the means of communication are unimpeded. This type of climate is the most energising in the world.

The wealth of forests gives rise to important timber industries; agricultural industries include the cultivation of temperate cereals and fruits, root and fodder crops; and pastoral industries include the rearing of sheep—both for wool and mutton—and cattle—both for meat and dairy produce. Off the coasts are situated valuable fisheries.

D. *The Eastern Cool Temperate Margins.*—These lands experience a more extreme climate, the winters being much colder and the summers somewhat warmer than those of the western margins. Further, the rainfall is by no means so abundant.

¹ *The Friendly Arctic*, by V. Stefansson.

This difference in climate is due chiefly to the fact that the prevailing winds are offshore.

The agricultural and pastoral occupations are similar to those of western marginal lands, but the severity of the winter climate makes it necessary for animals to be housed during that season; also it causes the cessation of water transport owing to the freezing of the rivers and lakes and the closing of the ports by ice. Valuable fisheries exist here, also, and forests provide valuable timbers.

Lands included in this type of region are eastern Canada, northern Manchuria, and the extreme south-eastern corner of Argentina—the whole of Africa and Australasia being excluded.

E. Interior Cool Temperate Lowlands.—To this type belong two great areas—the portion of the great central lowland of North America lying mainly within Canada, excluding the tundra; and the great stretch of level land, broken only by the Ural Mountains, which reaches approximately from the River Oder and the Swedish frontier to the River Lena. On account of their latitude and the lack of oceanic influences, these regions experience great extremes of temperature and a low rainfall. The winters are long and severe and the summers very hot. The rainfall, which occurs chiefly in summer, is sufficient for tree growth only in the cooler areas, where evaporation is less rapid, and there is a broad belt of coniferous forest in the north of this region linking up with the forested western and eastern margins. This belt of forest is the home of numerous fur-bearing animals, which are trapped for their valuable pelts. South of the cooler forested belt the rainfall is sufficient only for grass, though trees are not entirely absent. These cool temperate grass-lands are devoted to large-scale cattle ranching in the drier regions, and where the rainfall is sufficient they produce enormous quantities of wheat and other cereals.

F. Interior Mountain Areas in the Cool Temperate Zone.—These are found on the western side of the interior lowlands in North America—the Rocky Mountains—and on their eastern side in Eurasia—the Altai Mountains. The effect of altitude is seen in the snow-clad peaks and the tundra-like character of the vegetation immediately below the snow line, followed in turn by coniferous forest, deciduous forest and grass-land. Pastoral occupations are important, the higher pastures being utilised in summer and the lower in winter. Where the valleys are both warm and fertile, agriculture is practised.

Warm Temperate Regions.

G. The Warm Temperate Western Margins.—This region is usually spoken of as the *Mediterranean Region* because its typical development is in the lands bordering the Mediterranean Sea. It includes, in addition to these lands, central California, central

Chile, the extreme south-west of Africa, the south-west of Western Australia, the south-east of South Australia, and, in a modified form, North Island, New Zealand. The distinctive climatic features of this region are summer drought with hot weather, and winter rain with warm weather. The rainfall is relatively scanty, except where special conditions—*e.g.*, great elevation or local rain-bringing winds—increase it, and irrigation is often necessary for the cultivation of crops. In this region, contrary to rule, it is lack of moisture and not cold that causes cessation of plant growth, and this cessation takes place in summer—the growing season in higher latitudes. The result is that, given water artificially supplied, or given crops which can extract moisture from the deeper layers of the soil, this region is very productive.

The natural vegetation of the region is adapted to resist the drought and heat of summer by the small-leaved, leathery, dull-evergreen or evergrey foliage, the deep-striking roots, the development of thorns and prickles, resins, waxes, and essential oils, and the compact structure of trees, shrubs and herbs. Where the rainfall is sufficient, open woods of such trees as walnut, chestnut, ilex-oak, cork-oak, fir, cypress and cedar occur. Natural pasture lands are rare, and the driest areas present a semi-desert appearance. The grasses have not the rich succulence of those of the wetter, cool temperate regions and, in consequence, cattle are not reared in anything like the same number. The cereals, however, do well, especially where irrigation is practised, and wheat, maize, and barley are grown in large quantities, while rice thrives in certain localities. Sugar-cane and cotton also are grown. The lands of the Mediterranean region are most famous, however, for their fruits; these include olive, grape, fig, orange, lemon, apricot and peach. The vine is widely cultivated, and grapes, raisins, and wine are among the most important products. The olive tree, which is characteristic of the region, gives rise to the production of olive oil. The mulberry tree—on the leaves of which silkworms are fed—also is common.

H. *The Warm Temperate Eastern Margins.*—Lands of this type experience opposite conditions, as far as rainfall is concerned, for the rains come in summer and the winters are dry. The effect of the movement of the Trade Wind belt is just the reverse in this case, the winds in summer coming from the sea and in winter blowing from the cold interior of the continents, and the winters are not only dry but very cold. The lands included in this region are China, eastern U.S.A., Natal, eastern Australia (N.S.W.), south-east Brazil and the River Plate region, but it is only in China and the northern part of the eastern margin of U.S.A., which regions have much in common with the cool, temperate eastern margins, that the winters are severe; elsewhere the winters are mild. It may be noted that in China snow falls nearer the equator than in any other country of the world.

The forests of this region contain many valuable trees such as pine, cypress, cedar, walnut, chestnut, sycamore, and oak. Important shrubs and smaller trees are camphor, cinchona, yerba maté (Paraguay tea), tea, and mulberry. Important cereals are maize, wheat, millet, and rice; cotton, sugar-cane, indigo, tobacco, and poppy (opium) are other important products.

I. *Interior Warm Temperate Lowlands* include part of the Mississippi basin in North America, the Pampas of South America, and the Ural-Caspian lands in Eurasia. The climate is one of extremes and low rainfall, which is too scanty for timber growth, the natural vegetation being grass. These are steppe lands and are essentially stock-raising and pastoral regions, except in the better watered parts, where cereals such as maize, wheat, and barley are grown in large quantities.

J. *Interior Plateaus in the Warm Temperate Zone*.—These include the Iran Plateau, Asia Minor, parts of Arabia, the southern portion of the Kalahari Plateau and the High Veld of South Africa, the Great Basin of North America, the higher Mexican plateau north of the Tropic of Cancer, and the portions of the plateau of Central and Western Australia south of the Tropic of Capricorn. The rainfall of these regions is low, the climate is extreme, and considerable areas are desert or semi-desert and only very slightly productive. Where irrigation can be practised, cereals, cotton, tobacco, and fruits such as the fig, apricot and peach are grown.

Tropical Regions.

K. *The Tropical Deserts* are found in the Trade Wind zone on the western sides of the great land masses, and include the Atacama region of South America, the Colorado region of North America, the Sahara and tropical Arabia, the Thar of India, the Kalahari in South Africa, and the western part of the interior of Australia. The climatic characteristics are absence, or great scarcity, of rainfall, with a great range of temperature both between day and night and summer and winter. The cold ocean currents washing the western coasts of the Sahara, Peru, Lower California, South-West Africa, and Western Australia increase the aridity of these regions by causing any winds from the sea to be cool and dry. Much of the surface of these deserts is covered with sand dunes, and there is a general, but not total, lack of vegetation; that which exists is specially adapted to resist the great heat and drought. Where underground water wells up to the surface oases occur, and here, as also where a river flowing from distant snow-clad or rainy mountains brings life to a narrow belt of country, such as the valley of the Nile, the natural fertility of the soil is made apparent. In such regions palm trees flourish and cereals—such as maize, wheat, and barley—peas, beans, and tropical and sub-tropical fruits, such as the

date, fig, orange, lemon, pomegranate, melon, and olive are grown.

L. Eastern Tropical and Monsoon Lands.—These include Central America and the West Indies, much of the north of South America, including the Guiana lowlands, Brazil, excluding the Amazon basin, most of Central Africa, excluding the Congo basin, India and Indo-China, and North Australia. These are hot regions with abundant rainfall occurring chiefly in summer. The characteristic vegetation is savannah, *i.e.*, grass-land with clumps of trees, but considerable forests of an equatorial type are found in the hotter and wetter portions. These forests are more easily cleared than the equatorial forests, and the conditions are less unhealthy; the higher savannahs are quite healthy and suitable for European settlement. Some of the products—*e.g.*, mahogany, palm oil, rice, sugar-cane, and bananas—are the same as those of the equatorial lowlands. In addition to these, coffee, tea, indigo, jute, maize, wheat, barley and cotton can all be grown in these lands—wheat and barley being grown as winter or dry season crops, often by the aid of irrigation.

M. High Tropical and Sub-Tropical Mountains.—Such regions as the central Andes and Tibet experience an extremely rigorous climate and produce few vegetable products of importance.

N. Equatorial Lowlands.—This type of region attains its fullest development in the Amazon basin, the lower Guinea lands, and the Congo basin. The climatic characteristics are a uniformly high temperature and heavy rainfall throughout the year. The atmosphere is, therefore, hot and steamy, and the growth of vegetation is rapid and profuse. These lowlands are covered with dense forests, and the temperature throughout the year is so uniform that there is no resting period for plant life, and growth is continuous and rapid. Thus, where agriculture is carried on in forest clearings, it is one continuous fight between man and nature for the possession of the land. The forests contain such valuable timber trees as mahogany, ebony, and green-heart, and dye-woods such as logwood and brazil-wood. Rubber trees and oil, coco-nut and sago palms abound, and the cacao tree, the plantain, and the banana also are plentiful. Spices, such as vanilla, cloves, nutmeg and ginger are other important products.

The conditions in these regions render the natives indolent, and as the climate is extremely unhealthy for Europeans there is comparatively little development.

CHAPTER III

THE CHIEF COMMODITIES OF COMMERCE

THE commodities of commerce may be divided into three great groups, *viz.*, food-stuffs, raw materials (*i.e.*, products which are worked upon in bulk, and those which are destined to receive a higher degree of finish before passing to the consumer), and manufactures. In this chapter, however, the first two groups are combined and split up into commodities dependent on climate and minerals, the former including all vegetable and animal products.

COMMODITIES DEPENDENT ON CLIMATE

In the following account the commodities are considered according to the regions in which they are produced commercially on the largest scale, but it must be borne in mind that they are not necessarily confined to those regions. For example, many temperate products may be produced within the tropics, providing local conditions are favourable.

Temperate Products.

WHEAT is the most widely grown of all the cereals. As a result of the evolution by man of types of wheat suited to varying climates, and of the discovery and development of methods of cultivation appropriate to special conditions, it is widespread within temperate latitudes and, as a result, the total world supply fluctuates but little. Not only are the harvest times spread over the whole year, but when a failure of the crop takes place in one region, the adverse effect on the world's supply is usually counteracted by a good crop elsewhere. As wheat is the principal food-stuff of the white races, it will be realised that this is a matter of the greatest importance.

The ideal climatic conditions for wheat cultivation, a long, cool, moist growing period followed by a hot, dry ripening season, are found throughout the Mediterranean region, where wheat is an important product. The kind of soil, also, is of great importance, for as the plant has a heavy head, its roots must be able to obtain a firm hold of the ground. For this reason a stiffish soil, such as clay or loam, is required.

In these days of wheat production on a large scale, however,

there is another important consideration to be borne in mind. The larger and leveller the fields for cultivation, the greater will be the economies of production, for the conditions will be favourable to the employment of field machinery, and much human labour can be dispensed with which otherwise would be necessary. For this reason the regions producing large quantities of wheat *for export* are those temperate lands with large stretches of rolling grass-land, where the land is cheap and population sparse, as the prairies of North America, the pampas of Argentina, the steppes of eastern Europe, and the plains of Australasia. The one great exception to this is found in the case of India, where the chief factor determining the large production of wheat in the northern plains is not the size of the fields and the cheapness of the land, indeed the farms are comparatively small and the land dear, but the cheapness of labour. Though the production of wheat in western and southern Europe is very great, the countries are thickly populated, and the production is not nearly sufficient to satisfy the home demand.

The chief producing countries, in order of their importance, are the United States of America, Russia, Canada, India, France, Italy, Argentina, Spain, Germany, and Australia. It will be obvious, however, that many of these countries are the consumers of the largest part of their supplies. The principal exporters are Canada, Argentina, Australia, the United States, and India, while Russia, which was one of the chief wheat-exporting countries before the war, is steadily returning to normal. It is noteworthy that the export of Indian wheat varies considerably. During seasons when a deficiency of rainfall during the summer monsoon causes the rice crop to fail, the wheat is consumed in India. When, on the other hand, the monsoon rains are plentiful there is a large export, the Indian wheat being eagerly absorbed by the great consuming countries, for, at this time, the supplies of the northern hemisphere are approaching exhaustion.

RYE.—The second most important food-stuff used by the white races, rye is a very hardy cereal, which prefers a poor, sandy soil, and will mature in a colder climate with less care than wheat. It is essentially a *food crop*, grown mainly in central and eastern Europe for local consumption rather than for export.

The chief countries of production are Russia, Germany and Poland, together producing more than 80 per cent. of the world's crop.

OATS and BARLEY.—These are, like wheat, widely grown cereals, and are cultivated in those regions which are also favourable to the production of wheat, but oats can be grown in poorer soils and in damper and colder climates than wheat and is, therefore, found on the damper and colder fringes of the

principal wheat areas. It is grown chiefly as food for stock, and is exported largely from Canada and Argentina.

Barley has a wider range than either wheat or oats both as regards temperature, rainfall and soil. In the United Kingdom it is generally grown on the thinner soils, while wheat is grown on the deep soils, *e.g.*, in Wales. The principal exporting countries are Canada, the United States, India, Rumania, and, normally, Russia.

MAIZE.—This cereal, known as “corn” in America and “mealies” in South Africa, and chiefly important as a food for live stock, requires greater heat and more moisture than wheat. A long summer, with warm nights as well as warm days, with *rain in the ripening period*, are the most favourable conditions, and it is, therefore, an eminently suitable crop for warm-temperate and sub-tropical regions. In the Mediterranean lands, however, it can be cultivated successfully only where irrigation counteracts the summer drought.

The areas of production, in the order of importance, are U.S.A., about three times as much as the rest of the world, Argentine, Rumania, Russia, Brazil, Yuga-Slavia, Italy, India, Hungary, Mexico, Java, and South Africa.

Maize is marketed in various forms, *e.g.*, as grain, flour, maize oil, glucose, whisky, meat, leather, and dairy produce, and as the grain is specially important as a food for pigs and poultry, the price of maize affects that of bacon and dairy produce throughout the world. The principal exporting countries of maize and maize meal are Argentina, South Africa, and Rumania.

PULSES.—Of these pod-fruits suitable as food for man or cattle, *peas* are grown throughout the temperate zone, while Canada and U.S.A. have a considerable export; *beans* are widely grown, especially in the Mediterranean regions, where, also, are grown *chick-peas*, a product of India; *soya-beans* are produced in the monsoon countries; and *lentils* are typical of the Mediterranean countries and India.

ROOT-CROPS.—The most important of these are the potato and the sugar-beet.

Potatoes are grown where the climate is moist and cool, and thrive in such different localities as Ireland and the North German plain—the first with a considerable rainfall and a low range of temperature, the second with a comparatively wide temperature range and a low rainfall. In one respect the potato is similar to rye and rice, in that it is generally grown by man for his own use and not for export. Germany, with her cool and sandy plains, has found the potato her most valuable crop, and, in addition to using it as a food, obtains from it flour, starch, alcohol, drugs, and explosives.

The *Sugar-beet* requires a long, frost-free season with rain in

its period of growth and much sunlight and drought for ripening. A large amount of cheap labour is required, as the constant weeding and thinning needed have to be done by hand. For this reason only densely populated areas can grow beet successfully.

The chief producing countries are Germany, Czecho-Slovakia, the United States, France, Italy, Poland, Russia, Belgium, Holland, Hungary, Yugo-Slavia, Denmark, Sweden, and Rumania.

FRUITS.—The principal fruit-growing lands of the temperate zone are situated in the marginal regions. Of all the temperate tree fruits the *apple* is that capable of cultivation in highest latitudes and at the greatest altitudes. The lands most suitable for its cultivation, in company with the *pear* and the *stone fruits*, are those of the cool margins of the continents, but it may be grown also in the warm temperate zone. The chief producing regions are Western Europe, including the British Isles; North America, in the western marginal lands from British Columbia to California, in the Lake Peninsula of Ontario, Nova Scotia, and the north-western United States; and in corresponding regions in Australia and New Zealand.

Grapes are the fruit of the vine, which thrives in the warm marginal lands and in the warmer parts of the cool marginal regions where local conditions are favourable. It flourishes best in the Mediterranean lands, whose long, hot, dry summer is admirable for ripening the fruit, but it thrives also in the eastern United States. In Europe the chief producing regions are the Iberian Peninsula, France, Germany, Italy, Hungary, and southern Russia, the Crimea. Other vine-growing regions include California, Central Chile, Asia Minor, the Cape region of South Africa, south-west and south Australia, and North Island, New Zealand.

The various wines made from grape juice are important articles of commerce, as are also raisins and currants, sun-dried grapes of various varieties. The quantity and quality of the wine obtained from grapes depends to a very large extent upon the local conditions of cultivation. Generally the finest quality wines are made from grapes grown near the northern or, in the southern hemisphere, southern limits of cultivation.

France, Spain, Portugal, and Italy are the world's chief wine-producers. The wine industry is an intensive industry which can be successfully carried on only where there is a dense population and a consequent large supply of cheap labour, and since much skill is required in preparing the grape juice to get the required flavour, the industry tends to be highly localised. Moreover, wines acquire a reputation which tends to make the oldest centres the most important. The purely Mediterranean countries seem to be unfitted for storing wine, so that the wines of Sicily and Italy are always consumed when they are fresh,

and are not left to improve with age as are those of the Loire, Champagne, Charente, Garonne, Rhine, and Moselle districts of France. France, who leads the world in quality, output, and reputation, has developed a great export trade. In both South Africa and Australia, however, the industry is being developed and the export of wine is increasing.

Currants are the dried fruit of a small vine which is grown almost exclusively in Greece and the Ionian Islands.

The *Olive*, perhaps the most typical and extensively grown of all the Mediterranean trees, is cultivated chiefly for its product, *olive oil*, which is used in large quantities as a table oil, for culinary and medicinal purposes, and also in the manufacture of soap. Italy is both the greatest producer and exporter.

The *Fig* also is typical of the Mediterranean lands, though to a much less degree than the olive. The hinterland of Smyrna, in Asia Minor, is specially noted for the production of figs, and Smyrna is the chief port of export, while they are also cultivated successfully in Greece, Spain, and southern Italy.

The *Orange*, a native of the monsoon lands of south-eastern Asia, has now spread to many tropical lands and most of the warm temperate regions, thus being transitional in distribution between temperate and tropical regions. It has, however, become specially important in the Mediterranean lands, and oranges are exported chiefly from Spain, Italy (especially from Sicily), Algeria, the Levant, the West Indies, southern Brazil, South Africa, and southern Australia.

FLAX.—This is a plant yielding a variety of useful products, the most important being the fibre obtained from the inner bark of the stem. This fibre is itself called flax, and is spun and woven into *linen*. The seed, known as *linseed*, yields a valuable oil which is largely used in the manufacture of paints and varnishes; further, the crushed cake remaining after the oil has been extracted forms a valuable cattle food, while the ground seeds form the linseed-meal used for medicinal purposes. The *tow*, composed of the shorter fibres unsuitable for weaving, is used for the manufacture of rope and twine.

Flax thrives in a wide range of climate, but different regions cultivate the plant for different purposes. For instance, in India it is grown chiefly for the seed (for oil), the fibre of Indian flax being of little value; in the United States, too, it is grown chiefly for the seed; while where the fibre is the chief product, as in Russia and the Baltic States, the seed is much less valuable. In Europe, Russia and the Baltic States are the chief producers, but the best quality fibre is obtained from Belgium. The north-east of Ireland also produces excellent quality flax.

The human factor plays an important part in determining the distribution of flax, for, as one of those crops requiring the employment of a considerable amount of labour in the field, it is

only where there is plenty of cheap labour that the cultivation of flax and the preparation of the fibre can be carried on. This prevents its production in England and Scotland, even though the British climate is quite favourable.

HEMP produces a fibre similar to, but coarser and stronger than that of flax, and is used chiefly in the manufacture of sailcloth, canvas, ropes, and cordage. As with flax, it is grown through a wide range of climate, and the conditions of production both physical and human are similar. Russia normally produces the greater quantity; Italy, second as regards quantity, is first in quality. In India hemp is extensively grown for the sake of the drug *charas* which is obtained from it.

The name "hemp" is given to a number of similar fibres adapted to the same uses. The most important of these is *Manila hemp*, a tropical product obtained from the island of Manila in the Philippines. Others are *henequen*, or sisal hemp, largely cultivated in Yucatan, and now grown also in British Honduras and the West Indies; and New Zealand "flax," or *phormium*, which grows abundantly in that country.

WOOL.—This product is obtained from many animals, including the goat (mohair, cashmere), the camel, the alpaca, and the vicuña of the Andes, but the animal furnishing by far the greatest proportion, and the most important variety, is the domestic *sheep*. The great demand for wool has led to specialisation in its production by countries having large areas suited to sheep but which are too dry for agriculture and unsuited to cattle. Such areas are found in Australia, on the dry plains on the leeward (west) side of the eastern highlands, in South Africa (Cape Colony), and Argentina (Patagonia). Sheep cannot stand extremes of heat or cold, and wool is produced in tropical regions only where the modifying effect of altitude is felt, as in the Andes of South America; but regions having a considerable rainfall with mild winters are quite as suited to wool production as are dry ones, e.g., Great Britain, eastern New Zealand, parts of southern Chile, and the River Plate region of South America. Indeed Europe, including Great Britain, produces more wool than Australasia, but the large production is used locally in helping to satisfy the enormous home demand.

The chief exporting countries are Australia, Argentina, New Zealand, and the Union of South Africa.

SILK.—Next to wool, silk is the most important animal fibre. Natural silk is derived from the cocoons spun by the silkworm, a species of caterpillar which feeds on the leaves of the mulberry-tree. The silkworm can be reared, therefore, in any climate in which the mulberry thrives, the "worms" being usually kept under cover and fed on the leaves stripped from the trees. Silk is thus essentially a product of the warm temperate regions,

both of the Western and Eastern types. But again the working of the human factor is evident, and the distribution of raw silk production is by no means dependent only on climate. Notwithstanding the fact that there are many regions perfectly suited climatically for the purpose, the industry is almost entirely confined to the Old World, indeed to Asia and Europe. This restriction is due to the fact that cheap skilled labour is essential (*cf.* tea). "The tending of the silkworms previous to the spinning of the cocoons, and the subsequent operations necessary to prepare the raw silk for the market, demand not only a considerable amount of labour, but likewise the utmost carefulness and delicacy on the part of those employed. Silk-rearing is therefore generally confined to those parts of the world in which the labourers are not only content with low wages, but have inherited from previous generations a capacity for watchfulness and delicate manipulation, and have been trained in these habits from a very early age."¹

The chief silk-producing and exporting countries are Japan, China, and Italy.

MEAT AND DAIRY PRODUCE.—Cattle, sheep, and pigs can be reared throughout a wide range of climate, and their distribution depends rather on economic than on purely physical factors. Cattle are usually bred either for meat or for milk. In the former case they are the product of the "frontier" conditions, *i.e.*, cheap land and scanty population, found in the "newer" countries of the world. Wherever, however, the rainfall is reliable and the population increasing, cattle tend to be displaced by cereals, and in countries with large industrial populations they are usually kept for dairy production. Though this is so, it does not follow that the "newer" lands rear cattle exclusively for meat, for the production, for export, of butter, cheese, and tinned milk also is an important occupation of the people of such lands.

The chief *meat*-producing countries are the United States, the River Plate Region of South America (Argentina and Uruguay), and Australasia, but the Plate region is by far the most important as regards export. The United States normally exports but little meat, and the proximity of the Plate region to Europe gives it a great advantage over Australasia.

Denmark, New Zealand, and Australia far outstrip all other countries in the export of *butter*, but Argentina, Holland, the Irish Free State, Russia, Canada, Finland, and Sweden all export considerable quantities.

In the export of *cheese*, New Zealand, Holland, and Canada are the leading countries, others exporting smaller quantities being Italy, Switzerland, Denmark, Yugo-Slavia, Finland, Czecho-Slovakia, and Argentina.

¹ *Handbook of Commercial Geography*, by G. G. Chisholm.

FISH, though not dependent on climate in the same way as vegetation and animals, is considered here partly for convenience of treatment and partly because the temperature of the water—intimately connected with climate—has a marked effect on the distribution of the chief fishing-grounds. These are situated in shallow seas off the marginal lands of the cool temperate zone, the most valuable fishing ground of the world being the chain of submerged plateaux extending to the west and south-west of the Grand Bank of Newfoundland and including the Grand Bank itself. The eastern margin of the Atlantic off Europe also is a very valuable fishing ground. Though the Atlantic grounds are the most important, valuable fisheries, the chief of which are those of Japan, are found also in the eastern Pacific in corresponding latitudes.

Of the many different kinds of fish caught the most important for food purposes are the cod, herring, and salmon, which are plentiful off both margins of the Atlantic, the salmon in the rivers and shore waters and the cod and herring in the deeper waters. Salmon fishing, however, is a speciality of the Pacific coast of North America—particularly in the Columbia and Sacramento rivers in the United States, in the Fraser, Skeena, and Nass rivers, and the coastal inlets in Canada, and in the rivers and inlets of Alaska. The catching and canning of salmon for export is an important industry of these regions.

Off the Atlantic coast of North America the chief fish caught are the cod and halibut, over two-thirds of the exports of Newfoundland consisting of dried cod. Neither Newfoundland nor Canada, however, has such a large share in the fishing industry of these waters as has the United States.

The Great Lakes of North America also are rich in fish, of which white fish are the most valuable, both as regards quality and amount caught.

Of the European fisheries those of the British Isles are the most important, and of these the most valuable is the shallow North Sea. For this reason nearly all the great fishing ports of our islands are situated on the North Sea coast. The chief fish caught are herring, haddock, cod, plaice, mackerel, hake, pilchard, halibut, turbot, and sole. The Norwegian fisheries yield all three of the chief food fishes—cod, herring, and salmon, and the fishing grounds of France, principally those of the Mediterranean, yield the sardine, anchovy, and tunny. In Russia the rivers and the Caspian Sea yield an abundance of sturgeon, from the roe of which caviare is prepared.

The Japanese fisheries, which are the chief of the fisheries of Asiatic and Australian waters, abound with a great variety of fish, of which the most important are the sardine, herring, and bonito (a kind of tunny). Salmon and cod also are plentiful.

TOBACCO.—This plant can be cultivated under a great variety

of climatic conditions, from tropical to temperate, but the flavour and quality of the tobacco varies in a marked degree with the conditions under which it is grown. As, however, it is produced in the greatest quantities in the warm temperate zone, it may well be included among the temperate products. A rich and well-drained soil is required, and, although the plant is adaptable to differing conditions of climate, it is injured by frost and needs a warm summer.

The United States, chiefly in Virginia and Kentucky, has the largest production in the world, and is by far the chief exporting country. The other chief tobacco-growing countries are, in order, British India, the Dutch East Indies, Turkey, Brazil, Japan, Italy, Greece, Bulgaria, the Philippines, France, Yugo-Slavia, Cuba, and Algeria.

Sub-Tropical Products.

The sub-tropical regions are those transitional between the temperate zone and the torrid zone, and include all lands on the equatorial fringes of the temperate zone and on the fringes of the torrid zone.

COTTON.—This is the woolly fibre which grows in tufts attached to and enveloping the seeds of a shrubby plant and which, when the seed-pods, or bolls, are ripe and have opened, swells out in a mass about as large as a small apple, and can thus be easily picked. The plant can be grown in almost all tropical and sub-tropical regions, but it is cultivated most successfully in the latter or in elevated regions within the tropics—where, of course, sub-tropical conditions prevail. The temperate limit of cultivation is determined by the essential requirement of *seven months of frost-free weather*. Other climatic requirements are a good, but not excessive summer rainfall, a uniformly warm summer free from excessive heat, and plenty of bright sunshine. The last requirement has hitherto prevented the successful cultivation of cotton in the more cloudy regions of the torrid zone, and the beneficial effect of a sharp winter in keeping down insect pests has led to the production of both the greatest quantity and best quality in regions outside the tropics. Further, unless the plant is destroyed and replanted each year, the quality of the cotton deteriorates, and seasonal frost or drought are, therefore, beneficial in making a virtue of a necessity and so ensuring the maintenance of good quality. Another important factor determining the distribution of cultivation is the necessity for cheap labour.

In spite of the ravages of the boll weevil in the United States, that country is still by far the greatest producer. In order follow India, China, and Egypt, and these four countries together account for the bulk of the world's production. Other countries with a considerable production are Brazil, Persia, Mexico, and Peru, and there are many small producers. Cotton-growing is

of increasing importance in many parts of the British Empire, notably Uganda, the Sudan, and Nigeria, but is still little beyond the experimental stage. The future, however, may see a great development in Empire production.

TEA.—The tea plant is one of the hardiest grown in sub-tropical lands, for though severe frosts check its growth and adversely affect its yield they do not kill it. Its requirements of a warm climate, a considerable amount of rain, and good natural drainage make it an eminently suitable crop for hilly regions in the monsoon lands, where, also, the necessary supply of cheap, skilled labour is available, and India, Ceylon, China, Japan, Java, and Formosa are the chief producing and exporting countries.

Tropical Products.

COFFEE is obtained from the berries of a shrub grown throughout the tropics, which requires, for its successful cultivation, a warm and moist climate without excessive heat. It requires shelter from the direct rays of the sun and is usually grown under the shade of such trees as the banana. Like tea, it needs much cheap labour, but unlike tea, it is specially susceptible to frost. It is cultivated most successfully on the margins of the torrid zone where the comparatively cool, though frost-free, winters have a beneficial effect in keeping down insect pests (*cf.* cotton).

Brazil is by far the most important coffee producing and exporting country, but other important sources of supply are the Dutch East Indies (particularly Java), Central America, the West Indies, Venezuela, and British India. The coffee grown in Arabia (Yemen), the celebrated Mocha coffee, is of the finest quality, but the export is small.

COCOA, *cacao* as it is more correctly named, requires more heat than coffee, and, as it also requires much moisture with deep, rich soil, and is injured by strong winds, through the heavy pods being battered against the tree trunks and branches on which they grow, it is essentially a product of the hot, equatorial lowlands. Where grown outside the equatorial belt of calms, it will thrive only in hot, sheltered valleys. Its distribution is consequently more limited than that of either tea or coffee.

More than half the world's supply is obtained from the Gold Coast. Other important producing countries are Brazil, Ecuador, the West African islands of Sao Thomé, Principe, and Fernando Po, Trinidad and other West Indian islands, while production is increasing in Ceylon and Java.

RICE.—The chief cereal of the hot lands, rice, requires a high summer temperature and an abundance of moisture, in consequence of which the fields in which it is grown have to be

flooded at certain stages of its cultivation. It thus thrives in the equatorial lowlands and the monsoon lands, particularly in the great river deltas and on the low-lying coastal lands. The abundant summer rains of monsoon Asia suit it admirably, and the chief producing countries are China, India (including Burma), Indo-China, Siam, Japan, and Java.

Under favourable conditions, rice grows with great rapidity, two crops being frequently obtained in one year from the same ground, *e.g.*, in Bengal, and it yields more grain (by weight) per unit of area than any other cereal. Thus a large amount of vegetable food is available in regions in which it is most extensively grown, and these lands in Asia are the most densely peopled in the world. Consequently, as in the monsoon regions the bulk of the rice is consumed in the producing countries, rice does not enter into the commerce of the world as largely as might be expected, and a large production does not necessarily imply an export. Indeed, in some cases, where the production is large rice has to be imported owing to the big home demand (*e.g.*, Japan). It follows that only those comparatively thinly peopled lands of the regions where rice is the chief food-grain will have a surplus available for export. Burma, which is the least densely peopled of the world's great rice-growing regions, is the chief source of European and American supplies, although the area under rice in Burma is only about one-sixth that under rice in Bengal. The only other countries furnishing Europe with any considerable amount are Cochin-China and Siam.

Outside Asia, rice is grown in many hot and warm lands, notably in the southern United States, the West Indies, Central America, Brazil, British Guiana, British West Africa, the Sudan, Egypt, and northern Italy.

MILLET is the general name by which are known many other tropical grain-crops. The best known are probably the Great Millet and the Spiked Millet, both of which are cultivated extensively in India as food crops. The Spiked Millet is largely grown also in the Sudan, where it is known as *durrah*.

OTHER STARCHY FOOD-STUFFS.—Of these, *sago* is obtained from the pith of various kinds of palm growing in equatorial regions, the Malaysian "sago-palm" being the best known and most important. Plantations of this tree are now worked in Borneo and equatorial South America. *Tapioca* is prepared from the tubers of the manioc plant, the cultivation of which is carried on throughout most of the equatorial lowlands. It is exported chiefly from the East and West Indies. *Arrowroot* is derived from the root-stocks of various tropical plants. It is obtained chiefly from St Vincent, Jamaica, and the Bermudas.

SUGAR-CANE is essentially a tropical product, and is as distinctly restricted to warm climates as the sugar-beet is to cool

ones. The most favourable conditions include a damp soil and a warm, moist climate.

There has been continuous competition between cane-sugar and beet-sugar since the Napoleonic Wars, when the beet-sugar industry was first established by the French in reply to the military and commercial blockades of those wars, which cut off their supplies of cane-sugar. This competition has by no means been restricted to methods of cultivation and extraction, for fiscal legislation has played an important part. "Up to about 1886-88 the sugar-cane led, at one time quite easily, but owing to the bounty system on the continent of Europe the beet-root came abreast by about that time, and then gradually went ahead. In 1896 the sugar-beet supplied the world with five million tons of sugar, and the sugar-cane about $2\frac{1}{2}$ million, that is, the beet-root now supplied about two-thirds of the whole quantity. The bounty system and protective duties, in Central Europe chiefly, seemed likely to kill the sugar-cane industry. . . . In 1912 cane sugar had again forged ahead, and now supplied 57 per cent. of the world's supply."¹ The cane sugar industry was further greatly stimulated as a result of the Great War, which completely disorganised the European beet industry, and it still holds the lead in spite of the re-establishment and development of the European industry.

The chief producers of cane sugar are Cuba, India, and Java, but, since most of the Indian production is consumed locally, the chief exporters are Cuba and Java. Other exporting countries of less importance are Peru, the Philippine Islands, Mauritius, Dominica, Brazil, British Guiana, Egypt, Fiji, Trinidad, the Union of South Africa, Australia, and Jamaica.

The chief geographical circumstances affecting the rivalry of cane and beet in the sugar industry are tabulated below :—

<i>Cane.</i>	<i>Beet.</i>
(1) A tropical product requiring not only abundant heat but a very moist, rich soil. It does best on land not far from the sea, and is ruined by frost.	A temperate product thriving in a comparatively poor soil; it requires a moderate amount of spring and summer rain, a summer of moderate heat, and a cool, dry autumn.
(2) Requires only slight attention; it can be weeded with ploughs and hoes.	Requires much care and labour; the soil needs careful preparation, and weeding and thinning of the young plants can be done only by hand.
(3) It is perennial and once established will yield year after year with the minimum of attention.	A fresh crop has to be sown each year and much labour is required. Thus only densely populated regions can grow beet successfully.

¹ *The Groundwork of Modern Geography*, by A. Wilmore.

Cane.

- (4) It is grown where labour is cheap.

- (5) Is superior in sugar yield, but the final refuse after extraction of the juice is fit only for fuel.

Beet.

Grown where labour is relatively dear, but where, on the other hand, sugar is most heavily consumed and where capital for the best machinery is abundantly available.

The refuse forms a valuable cattle food.

QUININE is the most important of the medicinal extracts obtained from the bark of the various species of *cinchona*-tree, all of which are indigenous to the eastern slopes of the Andes in tropical South America. The trees are now grown successfully in many tropical regions and, as in the case of rubber, the plantation product has largely displaced the product of the wild forest tree. For two centuries the bark was obtained solely from the countries of the eastern Andean slopes; hence the name, still frequently applied to it, of *Peruvian bark*. By far the chief exporting country is now Java, followed by Sumatra, Ceylon, southern India, and Jamaica.

TROPICAL FRUITS.—Though there are very many different kinds of edible fruit growing within the tropics few of them enter world commerce. The chief of those which do are the banana, the pine-apple, the coco-nut, and the date.

The *Banana* requires a hot, damp climate and a deep soil and is grown as far north as Florida and southern Japan, and as far south as southern Brazil and northern Natal. Its cultivation is carried on for export chiefly in Central America (principally Costa Rica), Colombia, the West Indies, and the Canary Islands. The *pine-apple* is grown throughout almost all tropical South America, and in Central America and the West Indies. The *coco-nut* grows very widely throughout the tropics but thrives best near the sea, particularly on islands. It is most important commercially in the form of *copra*, which is the name given to the dried kernels. At present Ceylon, the East Indies, and the Pacific Islands are the chief regions for coco-nut cultivation, the leading producers being Malaya, the Philippines, Ceylon, the Dutch East Indies, and such island groups as Fiji. The *date*, a characteristic product of the tropical deserts, is produced chiefly in northern Africa, Arabia, Iraq, Persia and India.

The fruit of the *Oil Palm*, which grows in great profusion in the forests of West Africa, from Sierra Leone to the French Congo, does not enter into commerce as such but provides *palm oil* and *palm kernels*, both of which are exported in enormous quantities from British, French, and Portuguese West Africa. The palm oil, which is made from the fruit pulp, is used largely in the manufacture of soap and candles, as a lubricant for the

axles of railway rolling stock, and in the manufacture of tin-plate, while palm kernel oil is an important constituent of margarine. Unlike rubber and copra, palm oil and kernels are still obtained mainly from the wild trees. It is noteworthy, however, that oil palm plantations have been successfully established in Sumatra.

JUTE is the third most important of the vegetable fibres, following cotton and flax. It requires hot, moist conditions and is grown chiefly in the monsoon lands of south-eastern Asia. Its cultivation on a large scale for fibre, however, is almost exclusive to northern and eastern Bengal, and practically all the world's supply comes from the valley of the River Ganges. The fibre is used chiefly for the manufacture of gunny-bags and other coarse packing materials.

RUBBER or Caoutchouc, the solidified juice, or latex, of a number of tropical trees, has become the most important commercial product of the equatorial forest regions. The use of rubber for waterproofing was well known to the Indians of Central and South America long before the discovery of America by Columbus, but, until the nineteenth century, its only use known to Europeans was as an eraser, hence the name *rubber*. The rubber tree requires great heat and heavy rain and, until comparatively recently, it was from the trees growing wild in the equatorial forests of America and Africa that the world's supply was obtained. "For many years the whole rubber supply was derived from wild plants, the natives penetrating the forests and taking the rubber where they could find it. In most cases, the trees and vines were destroyed in collecting the rubber, and it was necessary for the rubber gatherers to push farther and farther into the forests in search of it. This, naturally, greatly increased the cost of the product, as the distance it had to be conveyed became longer, and in many cases the collection and transport to the ports was so expensive that no margin of profit was left in the trade. Some of the South American rubber has to be transported, by land or river, some 3,000 miles before reaching the port of shipment, and it takes as much as a year to reach the manufacturer in Europe. It became clear that a time was coming when all the accessible supplies would be exhausted, and the price of the commodity would eventually become almost prohibitive, at least for articles of ordinary use."¹ The rapidly increasing demand for rubber led to its introduction into Malaya and Ceylon as a plantation product, and so successful has its cultivation proved that, whereas in 1900 of the world total of 53,890 tons, plantation rubber accounted for only 4 tons, in 1922 the world's supply had increased to 379,920 tons, of which 354,980 tons were derived from plantations.

The chief producing and exporting countries are British

¹ *Rubber Planting in Malaya*, issued by the Malay States Information Agency.

Malaya (over half the world's supply), the Dutch East Indies, Ceylon, Brazil and Peru. Other sources are British India, French Indo-China and Borneo.

Products of Varied Climates.

TIMBER is a bulky, and consequently somewhat expensive commodity to carry, and, though there is now an enormous international trade in timber, it is exported on a large scale only where special facilities for transport by water are found. The different forest-bearing regions of the world produce many different types of timber, but with certain exceptions, *e.g.*, teak from India and greenheart from British Guiana, the timbers of tropical and sub-tropical regions are of the nature of luxuries rather than necessities, the chief timbers of commerce being the product of cool temperate regions.

Several valuable hard woods much used in furniture-making are obtained from the tropical forests. *Mahogany* comes from Central America and the West Indies, *ebony* is obtained chiefly from India, and *rosewood* from Brazil, to name but the three best known of a long list of such timbers. Tropical timbers of greater commercial utility are *teak* and *greenheart*—both very hard woods of great durability, little affected by continuous exposure to moisture and, therefore, of great value in marine construction. They are obtained respectively from India, Burma and Java and from British Guiana.

Warm temperate trees of note are the *walnut* of the Mediterranean lands; the *cedar* of Florida, much used for the manufacture of pencils; the *jarrah* and *karri* of Australia, both of which, like greenheart and teak, can stand long immersion and are much in demand for such purposes as the building of jetties and piers; and the *kauri pine* of New Zealand.

The most important timbers of commerce, however, are *firs* and *pin*es and, to a less extent, *oak*. In all the great lumbering regions timber from firs and pines forms by far the largest export, but there is also a large commerce in oak. The greatest timber-exporting regions are Canada, the United States, Russia (in normal times) and Scandinavia.

GUMS, WAXES, ETC.—These include *resin*, a substance which exudes from the trunks and branches of certain trees, and which is derived chiefly from the southern United States; *kauri gum*, a resin obtained chiefly by digging up the buried deposits from pre-existing forests in North Island, New Zealand; *camphor*, a crystalline substance obtained chiefly by distillation from the wood and leaves of a tree growing in Japan, Formosa, Central China, and the Malay Peninsula; and *eucalyptus oil and gum*, which are obtained chiefly from trees native to Australia. Resin is used largely in soap-making, paper manufacture and, in common with kauri gum, the finest of all resins for this purpose,

in the preparation of varnishes. Camphor and eucalyptus are chiefly of importance for their medicinal properties. *Lac*, a substance produced by the action of an insect on the branches of a tree which grows chiefly in India, is the chief constituent of sealing-wax.

SPICES AND CONDIMENTS.—These include *pepper*, derived from the fruit of a plant growing chiefly in the Malay Archipelago, Indo-China and southern India; *ginger*, the dried root of a plant native to south-eastern Asia and now grown also in the West Indies and British West Africa; *cinnamon*, the bark of the twigs of a tree grown chiefly in Ceylon, but also in the Malay Archipelago, the Seychelles, the West Indies and South America; *allspice* (or pimento), the unripe dried berries of a plant cultivated chiefly in Jamaica; *vanilla*, the pod of twining orchid now produced chiefly in Mauritius and Reunion and other islands of the Indian Ocean; *cloves*, the dried flower buds of a plant grown chiefly in Zanzibar and Pemba; and *nutmegs*, the kernels of the fruit of a tree, produced chiefly in the West Indies.

DYE-STUFFS, ETC.—The development of the synthetic dye industry has made vegetable dyes of comparatively little importance to-day, and some, once largely grown, have gone entirely out of cultivation. *Indigo*, however, is still grown in considerable though much diminished quantities, chiefly in India and Central America. *Cochineal*, a red colouring matter largely used in confectionery, is obtained from the dried bodies of an insect which feeds on a plant largely cultivated for the sake of this product in the Canary Islands. Dye-woods include *logwood*, which yields a dark red extract and is grown chiefly in Central America and the West Indies; *fustic*, which yields a yellow dye and also is grown in Central America; and *Brazil-wood*, yielding a red dye and grown chiefly in tropical South America.

Vegetable tanning materials include the *bark* of the oak, larch, hemlock and acacia, all products of the temperate regions, and *extracts* prepared from the wood of the oak, hemlock and chestnut. Other important extracts are *quebracho*, obtained from the wood of a South American tree, and *gambier*, obtained from the leaves of a shrub growing in Malaya and the East Indies. *Sumach* is a tanning material consisting of the ground leaves and twigs of a shrub growing chiefly in Sicily, Tunis and Algeria.

MINERALS

Though climate has nothing to do with the distribution of minerals, it nevertheless has a considerable effect upon their exploitation, for the climatic conditions under which they have to be worked have an important effect. Thus, tropical heat and aridity or arctic cold often put serious difficulties in the way

of the exploitation of valuable mineral deposits, even if they do not altogether prevent it. But the chief problems in mining have little to do with climate as a rule, rather do they concern such matters as the ease or difficulty of extraction, the supply of power, the provision of transport, and the supply of suitable labour, for in the mining industry the *human* factor is of paramount importance.

Coal and Iron.

The two most important minerals of the world to-day are coal and iron, for the countries which lead in coal production and have readily available and adequate supplies of iron are those which also excel in manufacture. Raw materials tend to cause manufacturing industries to develop at the place of production of the raw material in inverse proportion to the amount of the raw material entering into the composition of the finished article. Thus, coal, which in almost all manufactures is entirely consumed in the process and does not form part of the final product, has a very powerful attraction for manufacturing industries. It means not only potential power but power which, as far as competitive manufacturing is concerned, can be used only in the coal-producing area. For though coal may be exported to some country remotely situated from the source of supply and there used in precisely the same way and for the same purpose as in the country of origin, owing to its bulk and the consequent heavy cost of transport, the articles manufactured in the importing country could not possibly compete in the world market with those made in the coal area. This is one of the main factors underlying the commercial and industrial greatness of Britain; it explains why a map of the developed coalfields of the world is also a map of the world's great industrial regions; it explains the economic position of those countries producing raw materials such as wool, cotton, and the base metals, for however rich in these materials a country may be, industrial greatness can never be attained while there exists the necessity of importing power in the form of coal.

COAL occurs in many parts of the world but by far the greatest producing countries are the United States, Great Britain and Germany, these three countries accounting for over three-quarters of the world's supply. Smaller, but nevertheless still important, supplies are obtained in France, Poland, Japan, Belgium, India, China, Russia, Australia, Czecho-Slovakia, the Union of South Africa, and Canada.

IRON is so plentifully distributed throughout the world that only the richer ores are mined, those of less than 25 per cent. iron content usually being left untouched. As in the case of coal, the United States is by far the largest producer of iron

ore, but France, Great Britain and Germany all produce large quantities.

Many other countries, however, contribute largely to the world's supply, particularly in cases where the deposits occur near navigable water. Iron ore usually has to go to the fuel for manufacture, and the cost of transport, which is, of course, much lower by water than by rail, plays an exceedingly important part in determining the sources of supply. Deposits found near the sea, as in Newfoundland, northern Spain and Sweden, are worked where those of continental regions are often left untouched. They are, in terms of freight rate, much nearer to the great iron manufacturing centres of the world. Extensive iron making, in which the United States, Great Britain, France, Germany and Belgium hold the lead, is confined to highly industrialised countries where the requirements of excellent transport facilities, abundance of capital for the enormous plant required, a large supply of labour, and a large market are met.

Petroleum.

The enormous and rapid expansion of oil-burning ships and oil-using industrial machinery, and the development of the motor-car, aeroplane, and motor-ship, have made the supply of petroleum a matter of first importance in the world of to-day, and its production has increased considerably during recent years. Not only does petroleum provide fuel for use in the internal combustion engine and for firing steam engines, but its refinement yields many products, *e.g.*, vaseline and lubricating oils, of great value.

In 1926, over 70 per cent. of the world's production of petroleum was mined in the United States, and of the remainder nearly 90 per cent. was obtained from Mexico, Russia, Persia, Venezuela, the Dutch East Indies, Rumania, and Peru, in that order.

It should be noted that oil can be transported in the same way as water, *i.e.*, by means of pipes. In some cases it is carried by pipe lines for hundreds of miles, the producing areas being linked in this way with the consuming centres or with the ports of shipment, where the tank steamers are loaded direct from the pipes.

Natural gas, which accompanies the petroleum in practically every oil field, is of great industrial value during its short life, especially in North America. In the United States this gas has proved of very great importance in the iron and glass industries and is used both as boiler fuel and for the illumination of towns. Canada has important supplies in Alberta.

Asphalt, a product due to the thickening of petroleum by the absorption of oxygen from the air, is obtained in large quantities from the so-called pitch lake of La Brea in Trinidad. Its chief use is in paving.

Other Important Minerals.

GOLD.—Over half the world's gold supply is produced in the Union of South Africa. The other chief producing countries, in the order of output, are the United States, Canada, Rhodesia and Australia.

SILVER is mined chiefly in Mexico and the United States, which together yield about two-thirds of the world's supply. Canada, Australia, Peru, Bolivia, Chile and Japan, all produce considerable quantities.

TIN is mined chiefly in the Malay States, Bolivia, China, Siam, and Nigeria. Of these regions, the first two together account for more than half the world's supply, the Malay States being the greatest producer, with an average production for the years 1920-25 of nearly a third of the world's output, while that of Bolivia was rather less than a quarter. In comparison with the output of these countries, the production of other tin-mining regions, such as Australia, England (Cornwall), Burma and South Africa, is almost negligible.

COPPER.—The greatest copper producing country—more than half the world's production—is the United States. The metal is widely distributed, however, and there are many other producing countries. The chief of these, after the United States, are Chile and the Belgian Congo.

Less Important Minerals.

These include *zinc*, an important product of Germany, Belgium and the United States; *quicksilver* (or mercury), obtained chiefly from Spain, Italy, Peru and the United States; *lead*, from the United States (chiefly), Spain, Germany, Mexico, Australia, Canada, Burma and the United Kingdom; *platinum*, principally from Colombia and Russia (normally easily first in production); *nickel*, *cobalt* and *asbestos*, chiefly from Canada; *bauxite* (from which aluminium is produced), from the United States, France, Italy, British Guiana, and in small quantities from Northern Ireland and Greenland; *antimony*, from China, France and Mexico; *manganese*, from Brazil, British India, Russia and the Gold Coast; *sulphur*, from Sicily; and *nitrate of soda*, chiefly from Chile.

Precious stones include diamonds, chiefly from South Africa, but also from Brazil and British Guiana; emeralds, chiefly from Colombia; rubies and sapphires, from Burma, Ceylon and Siam.

Salt, though universally used and of great importance to mankind, is usually more a commodity of local production than an article of international commerce. The chief producing countries are the United States, Great Britain, India, Germany, Russia, France, Spain, Poland, Italy and Portugal.

MANUFACTURES

The Localisation of Manufactures.

Though the geographical position of manufacturing industries is the result of the action of many factors, the following may be regarded as of special importance :—

1. Facilities for carrying out the necessary processes of manufacture.
2. Ease of obtaining the raw materials required.
3. Facilities for the distribution of the manufactured articles.

The first factor involves the adequate supply of *power*, both mechanical power and man power, and is by far the most potent force in the localisation of industries. When water provided the power required for driving the simple machinery then used, industries tended to concentrate on the banks of rivers and streams, but, with the Industrial Revolution, the utilisation of steam power attracted them to the coal-mining areas. Here, therefore, the population rapidly increased, and it is in these regions that the second type of power required, man-power, is also most abundantly available.

Though, for these reasons, the coalfields have long been, and still are, the most highly industrialised parts of the world, a new factor is now making itself felt. This is the development of electric power. Unlike steam power, electricity is not confined for use to the place of generation; it can be easily and cheaply transmitted by cable over long distances. Its effect is, therefore, quite the reverse; instead of concentrating manufacturing industries in comparatively small areas it is tending to scatter them, and its decentralising influence is becoming more marked every year. By using electric power, industries are free to develop in regions lacking in coal and to move from the towns to the country, where rents are comparatively low, there is plenty of room for expansion, and the working conditions are much more healthy. Hydro-electric power is also encouraging the establishment of manufactures in regions rich in water power but poor in coal, *e.g.*, Northern Italy and Switzerland.

The main point to be borne in mind with regard to the second factor is that heavy transport charges, for imports of raw materials to the place of manufacture, would soon have a serious effect upon an industry, and, indeed, would normally make its establishment and development an economic impossibility. It is for this reason that raw materials tend to attach industries to the place of their production in inverse proportion to the amount of the raw material entering into the finished product.

As regards the third of the factors, it will be readily appreciated that the distribution of the goods to the buyer is an important consideration. The primary object of manufacture is to

sell the finished products, and however excellent the facilities for the establishment of an industry might be, that industry would never arise unless the markets for the goods produced were easily accessible. For this reason manufacturing industries tend to develop as near as possible to the markets for their products. Thus, where the market is world-wide, the industry will tend to become established near the coast, at navigable water if possible, so that its products can be carried to their destinations with the least possible expense.

The great development in means of transportation, however, has had an important effect in this connection, and manufacturing industries whose products are sent to all parts of the world are to-day firmly established far inland. In such cases, however, the products are usually of great value in proportion to their bulk, and thus can stand the relatively high transport charges. The great effect of the improvement of transport facilities is very marked in the case of industries producing perishable commodities, such as butter and fruit, and the enormous development of these industries in Australia and New Zealand, for example, has been the result of the provision of modern cold storage facilities and of the decrease in the time-distance between Australasia and the European markets.

Among other factors affecting the localisation of industries, the principle of *territorial division of labour* is important. If this principle were adopted by all nations, countries would specialise in the production of those commodities which they could produce with the greatest comparative advantage to themselves, and would exchange their surplus for the products of other nations. But the action of governments, in raising tariff walls against the importation of certain commodities and in artificially stimulating their local production by the payment of bounties, prevents its free working. Nevertheless, territorial division of labour is carried out in a modified form; for instance, it is to Britain's advantage to exchange manufactured goods, for the production of which she is specially suited, for raw materials and foodstuffs, which, even when she herself can produce them (*e.g.*, wheat, meat and wool), can be obtained more cheaply from other countries.

Geographical Inertia.

Sometimes, however, an industry exists in spite of unfavourable conditions. In such cases it will usually be found that at one time the factors operated in its favour but that a change has taken place. For example, the raw material may have been available locally and the supplies may have been exhausted, thus necessitating the importation of supplies. Once established, however, an industry will tend to remain in that place and to attract subsidiary industries, for all the arrangements for con-

ducting the processes in that locality will have been made and developed, the workers are there and have the necessary hereditary skill, the factories and plant are there, the transport facilities exist, and the local reputation has been established. This tendency for industries to remain where they were originally established, in spite of certain conditions becoming adverse to their continuance, is due to what is usually spoken of as *geographical inertia*.

THE BRITISH EMPIRE

CHAPTER IV

THE BRITISH EMPIRE AS A WHOLE

THE British Empire comprises nearly a quarter of both the land surface and the total population of the globe and, though by far the greater portion lies in the temperate zone, extends into every type of natural region. Its territories are scattered throughout the world from the shores of the Arctic Ocean to Antarctica, and among its inhabitants it numbers members of every race of mankind and peoples in every stage of development from barbarism to the highest level of civilisation. This scattered nature of the Empire not only results in a great variety of products, a matter of great economic importance, but, by the problems to which it gives rise, cultivates in the members of the British race an unique breadth of outlook on world problems and at the same time gives them a very real interest in the solution of such problems.

The British Empire, however, is not merely a large aggregate of British possessions thrown together under one flag; it is something far greater than the sum of its geographical and ethnographical components. The very scattered nature of the Empire has given birth to a number of self-reliant young dominions, keenly conscious of their own nationality, governing themselves in their own way and formulating their own economic policy. Truly a Commonwealth of Nations unprecedented in the history of the world, a unity standing for the common interest, owning allegiance to an imperial ideal represented by the Crown, rendered more intimate by a common tradition and a common language, and, since the Great War, strengthened by the sharing of a great common danger.

Imperial Relations.

Many of the various constituent parts of the Empire have now achieved some measure of maturity, and are acquiring economic strength based on rich natural resources coupled with the advantages of scientific and technical research. Also, distance, from the point of view of communication, is constantly diminishing and the closer contact between the countries is giving rise

to new and important problems. The Mother Country has now to deal with a family far beyond the infant and dependent stage ; indeed, to some extent, conditions are reversed, she herself being the dependent one and having to rely on her sturdy offspring for raw materials, markets, and even defence in time of war. It is natural in these circumstances that the relations between Britain and the dominions and colonies should have changed with the passage of time, just as those between the head of a family and his sons changes as they reach maturity.

The most notable feature in Imperial relations to-day is the growing personal contact between the Governments of the Empire, evidenced in *Imperial Conferences*. These conferences owe their origin to the meeting in London in 1887, at the Jubilee of Queen Victoria, of the Premiers of the self-governing dominions, and they have since been held from time to time in London for the consideration of matters affecting the Empire as a whole and its relations with foreign Powers and, recently, the League of Nations. The 1926 conference, under the presidency of Mr Baldwin, was responsible for changes of considerable interest rather than of fundamental importance. Following on the revision of the position of Ireland (see below), the Inter-Imperial Relations Committee recommended, and the conference adopted, the alteration of the *King's Title*. The correct title of the King is now "George V., by the Grace of God, of Great Britain, Ireland, and the British Dominions beyond the seas King, Defender of the Faith, Emperor of India." Formerly he was King of the *United Kingdom of Great Britain and Ireland*, etc., but reference to the United Kingdom is now omitted. The same report defined the relations between Great Britain and the Dominions. "They (*i.e.*, the dominions) are autonomous communities within the British Empire, equal in status, in no way subordinate one to another in any respect of their domestic or external affairs, though united by a common allegiance to the Crown and freely associated as members of the British Commonwealth of Nations."

The more urgent problems dealt with by recent conferences concern the status of the Dominions, involving the reconciliation of the principle of self-government with an Imperial Foreign Policy, Imperial Defence, Imperial Preference and Emigration.

In many other spheres Imperial Relations have a concrete foundation and the parts of the Empire are more closely linked up thereby. The Imperial Shipping Board, the Imperial Bureaux of Entomology, of Mycology, of Forestry, etc., are symptoms of growing inter-dependence of the countries of the Empire. More and more is the Empire tending to become a *commercial unit* with its parts bound closely by economic and financial interests, as well as by tradition and sentiment. Unity is further strengthened in that the Colonies provide what Great Britain needs urgently, *i.e.*, markets, and Great Britain can supply what the Colonies require, *i.e.*, in the words of Mr Bruce, Premier

of Australia, "men, money, and markets." Imperial Relations are therefore based on bonds, both strong and close.

The relations between the Mother Country and the various parts of the Empire differ considerably. There are countries of the Empire, those colonised by the British people, where self-government is well developed and the Imperial Government acts in a supervisory and advisory capacity. These are lands which are rapidly attaining economic independence. On the other hand, there are vast tracts of territory where development is backward, where civilisation is in all stages and very rarely beyond that of the sixteenth century. Such are the tropical and sub-tropical regions where western civilisation has not been able to penetrate, because the climatic conditions render it impossible for the white man to settle and work there, and native intelligence has not reached the standard of western peoples. It is necessary in such lands that the administration of affairs should be in the hands of a controlling and directing body, and it must, therefore, follow that the amount of self-government possessed by the countries of the Empire will show considerable variation. Where white men predominate, self-government will prevail, and where the inhabitants are coloured, Empire direction will exist in differing degrees. Of those territories where administration is largely directed from the Parliament at Westminster as manifest in some such official as a Viceroy or Governor, India and the West Indies are the most advanced, but they are still far behind western civilisation.

Composition and Extent of the Empire.

As regards its composition, the British Empire may advantageously be dealt with under four main headings, *viz.*, The British Isles, The Colonies, The Indian Empire, and Protectorates and other Dependencies.

THE BRITISH ISLES comprise all the islands belonging to Britain off the north-west European coast, the term being purely a geographical one. The political divisions of the islands are as follows :—

- | | | |
|----------------------------|------------------------|------------------------------|
| (i) England | } <i>Great Britain</i> | } <i>The United Kingdom.</i> |
| (ii) Wales | | |
| (iii) Scotland | | |
| (iv) Northern Ireland. | | |
| (v) The Irish Free State. | | |
| (vi) The Isle of Man. | | |
| (vii) The Channel Islands. | | |

The smaller islands round the coasts form part of the country or county to which they are adjacent, *e.g.*, the Isle of Wight is linked with Hampshire.

Ireland was, by the Government of Ireland Act, 1920, divided into two states: Northern Ireland, consisting of six of the nine

counties of Ulster, and Southern Ireland, consisting of the rest of the island; and by the Irish Free State Constitution Act of 1922, Southern Ireland became the Irish Free State, "a co-equal member of the community of nations forming the British Commonwealth of Nations." It is, therefore, one of the self-governing dominions.

The Isle of Man, though subject to the sovereignty of the British Parliament, has a parliament of its own, consisting of the Governor, the Council, and the famous and ancient House of Keys. The Acts of this Assembly must, however, receive the assent of the King in Council before they have legal effect.

The Channel Islands are composed of a group of islands of which the two largest, Jersey and Guernsey, have their own legislatures, but, like the Isle of Man, are subject to the Imperial Parliament. Most of the smaller islands of the group are treated as part of Guernsey.

"The British Dominions beyond the Seas," is the designation applied to the remainder of the Empire.

THE COLONIES, strictly speaking, are "any part of His Majesty's dominions exclusive of the British Islands and of British India," but in practice, the self-governing dominions are not known as "colonies," for there is a marked difference between them and colonies within the ordinary meaning of the term. Self-governing dominions are equal and independent nations in the Empire, having a right to a voice in deciding imperial foreign policy, but "colonies" do not enjoy full self-government, the Imperial Parliament being responsible in varying degrees for their administration.

The Self-governing Dominions are as follows:—

- (i) The Dominion of Canada.
- (ii) The Commonwealth of Australia.
- (iii) The Dominion of New Zealand.
- (iv) The Union of South Africa.
- (v) Newfoundland.
- (vi) The Irish Free State.

Colonies other than self-governing dominions are *Crown Colonies*. These are very numerous and differ very much in their constitutions. They vary in type from Malta, which enjoys responsible self-government as regards its internal affairs, to Gibraltar, which is without a legislative council of any description.

THE INDIAN EMPIRE is a great dependency quite distinct in type from other British possessions, and though at present British sovereignty over India is complete, the Government of India Act of 1919, which gave a generous measure of authority to the Indian representatives in the Provincial Governments,

is a big step in the direction of the granting of complete self-government on equal terms with the Dominions.

PROTECTORATES AND OTHER DEPENDENCIES.—The term "dependency," used in its imperial sense, indicates any British possession not having self-government, and the Empire may, therefore, be broadly divided into (1) the British Commonwealth, and (2) British Dependencies. The term has, however, a much narrower meaning, indicating an area, not strictly within the Empire, which is so much under British influence that it is, for all practical purposes, a British possession. The chief of the many varieties of these is the Protectorate.

A *Protectorate* is a country governed by native rulers by

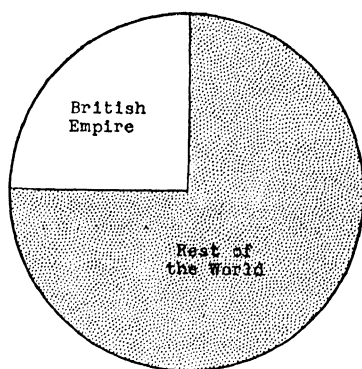


FIG. 10.—COMPARATIVE AREAS OF THE BRITISH EMPIRE AND THE REST OF THE WORLD.

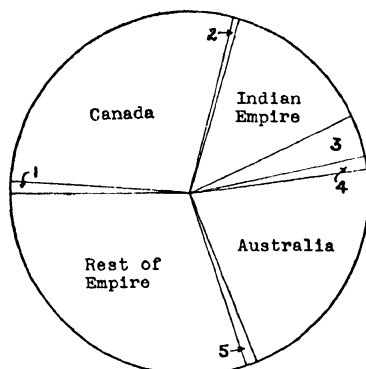


FIG. 11.—COMPARATIVE AREAS OF THE COUNTRIES OF THE EMPIRE.

1. British Isles. 2. Newfoundland. 3. Union of South Africa. 4. Southern Rhodesia. 5. New Zealand.

whom it has been placed under British protection, though not as a part of the Empire. The term, therefore, indicates control as opposed to ownership. In most such cases, however, protection has led to complete British occupation and administration in the interests of peace and security, and the power left to the local kings or chiefs is generally very small. This is the case in the Protectorates of Uganda and Zanzibar. In the Bechuanaland Protectorate, on the other hand, the people are still ruled by the native chiefs under supervision and advice, and the Federated Malay States, also, retain their native rulers.

A *Mandatory Sphere* is a territory which has been placed by the League of Nations under the care of one of the "advanced nations who by reason of their resources, their experience, or their geographical position, can best undertake this responsibility." The nations so made responsible for the welfare of the peoples placed under their care render to the Council of the League an

annual report on their charge. The chief areas subject to British mandatory influence are Iraq (Mesopotamia), Palestine, S.W. Africa, and Tanganyika Territory.

A *Sphere of Influence* is yet another type of Protectorate, being a territory over which another Power has undertaken not to acquire by treaty, influence or territory. Persia before the war was in the British sphere of influence.

The extent and comparative areas of the Empire are clearly shown by Figs. 10 and 11.

Population of the Empire.

The lands of the Empire lying within the temperate zones

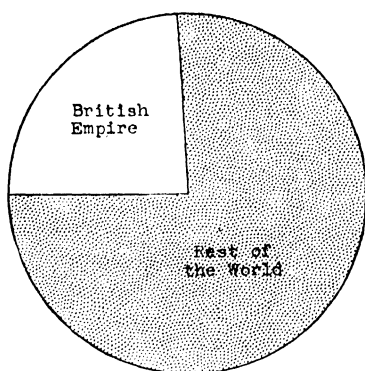


FIG. 12.— COMPARATIVE POPULATIONS OF THE BRITISH EMPIRE AND THE REST OF THE WORLD.

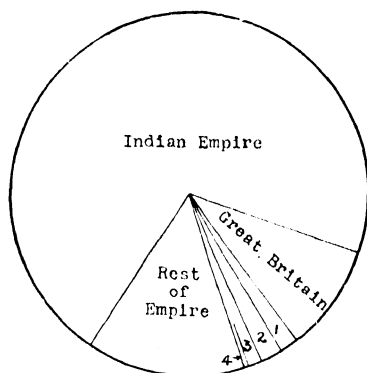


FIG. 13.— COMPARATIVE POPULATIONS OF THE COUNTRIES OF THE EMPIRE.

1. Union of South Africa. 2. Canada.
3. Australia. 4. New Zealand.

have a total area of about $4\frac{3}{4}$ million square miles, but while the mean density of population over the total inhabited area of the earth is about 36 persons to the square mile, in the British temperate lands it is only 14. Even this figure gives but an incorrect impression of the sparseness of the population throughout the overseas dominions, however, for it must be borne in mind that nearly two-thirds of the British people live in Great Britain. If we omit the British Isles from our calculation, therefore, the density of the population in the Commonwealth is less than 5 persons to the square mile. (Compare Figs. 10 and 11 with Figs. 12 and 13.) Thus there is ample room for the expansion of the white race within the countries of the Empire itself, especially as many of the lands lying within the tropics experience a climate tempered by the effects of altitude and are thus made fit for white settlement.

Serious problems, however, arise as a result of the under-

population of so much valuable land, while many parts of the world are suffering severely from the effects of over-crowding and urgently desire new lands to colonise. Thus, Australia's population is largely concentrated in the towns, and vast tracts of fertile land remain uninhabited. Indeed, the population of the continent is extremely sparse, there being only two persons to the square mile. In addition, there are vast areas in the tropical region in the north, which, though unfit for settlement by the white man, are eminently suitable for occupation by natives accustomed to hot and humid climates, and it is not surprising that the peoples of the over-populated Asiatic lands cast envious eyes on the lands which we hold but as yet have failed to occupy. There is little doubt that if it were not for the fact that the Mother Country would, should necessity arise, come to her assistance, Australia's strict immigration regulations, designed to preserve the land for the white man, and to avoid the problems which arise when white and coloured races mix, would be of no avail and the continent would be invaded by people of the yellow races.

The number of coloured people living within the temperate lands of the Empire is nearly six millions—a comparatively small figure. Moreover, nine-tenths of these live in South Africa, so that elsewhere in the Commonwealth the coloured population is very small indeed. It is in the Dependencies—in the wide meaning of the word—that the coloured peoples of the Empire are in the majority. Just as the Commonwealth lies mainly within temperate latitudes, so the Dependencies lie chiefly within the tropics, and here, as a rule, conditions are adverse to colonisation by the white man. In striking contrast to the Commonwealth, however, not one of the larger Dependencies is inhabited by people of one race; they are, indeed, characterised by the great diversity of their peoples, few of whom are white, not only as regards race, but in language and religion. With few exceptions the population of the Commonwealth is of British descent, Australia and Newfoundland completely so, and New Zealand, except for the Maoris in North Island. Canadians are largely of European descent—French or English, with a number of Eskimos and Indians, while South Africa is a mixture of Europeans, English and Dutch, and natives of very many grades and conditions.

The Economic Development of the Empire.

The British Empire has a wide range and a great variety of material resources, and it is interesting and instructive to consider the question of whether the Empire could become a self-supporting unit.

It is obvious that the foreign trade of the Empire is very extensive. Of the total overseas trade of the British Isles only a

comparatively small proportion is with the colonies; while the colonies, too, trade extensively with countries outside the Empire. Supplies of petroleum, of increasing commercial importance, cane sugar, and raw cotton are among the many commodities imported into England mainly from foreign countries, and Canada finds the most profitable market for her lumber in the United States. It is possible that to a very great degree the economic causes of this position may be overcome, for transport is improving in speed and efficiency, and freight charges are finding lower levels, while the vital question of costs will not have the same economic *pull* as conditions of production are improved in those countries vaguely described as "new" countries. Moreover, it is natural that the members of the Empire, recognising a bond between them, though possibly, in some cases, little more than a sentimental tie, should wish to support each other as members of the same family, and that the young nations of the Commonwealth should look to the Mother Country, with her extensive consumption of raw materials and food-stuffs and enormous production of manufactures, to obtain her supplies from them; and that she, in turn, should expect to find in them a ready market for her manufactured goods. And to a large extent this attitude is not without economic foundation, for many important food-stuffs and raw materials are supplied within the Empire, *e.g.*, wheat, meat, and wool, and the strength of the Empire was severely tested in this respect during the war.

In considering the possibility of a self-supporting Empire independent of foreign supplies of the essential commodities of commerce, an important point to remember is that the Empire is not a geographical unit, but consists of countries widely scattered over the surface of the globe—an economic disadvantage which has to be counteracted as far as possible by the development and maintenance of efficient means of communication between all its parts, and especially between the overseas dominions and the British Isles. A great power such as the United States of America can much more easily and naturally become self-supporting, because its economic strength is concentrated in one large area able to produce within its bounds the commodities required. Thus, though the British Empire actually produces, or could be made to produce, sufficient quantities of food-stuffs and of many important raw materials to satisfy the Empire demand, it would be extremely difficult and in many cases inexpedient to render the Empire independent of foreign supplies of many of those commodities, on account of the economic conditions adverse to alteration in the natural course of trade between neighbouring countries which would be necessary to bring about an exclusive commerce within the Empire. For example, British sea trade is dependent on quick deliveries, and the transfer of ships from a United States route to an Australian

route, for instance, would involve considerable financial loss, as it would mean that the clearing of vessels would take about three months instead of three weeks. For reasons such as these it will, in many cases, always be more advantageous for the widely separated parts of the Empire to trade with neighbouring foreign countries than with each other.

Again, in considering the question of developing a certain product within the Empire, the question of world supply must be considered. It would be fatal for a colony to attempt the production of a commodity on such a scale as to make the world's supply greater than the demand, even though it were possible to develop the resources of the Empire in that commodity. Such a state of affairs would soon result in the cessation of production in the new areas and the ruin of the colonists. Thus under normal conditions it is not always desirable to develop fully the resources of the Empire in every commodity, and in many cases latent possibilities must perforce remain latent until conditions alter. An illustration of the response to changed conditions is found in the production of *rubber*, which was obtained chiefly from regions outside the Empire, until the growing demand and the increase in price due to the increasing difficulties of collection in the equatorial forests, gave the necessary impetus to the realisation of the possibilities of Ceylon and Malaya for the cultivation of the rubber-tree in plantations. A more recent illustration is found in the case of *cotton*, for the production of which, as of rubber, the Empire has great possibilities. The great damage done some years ago to the American cotton growing areas by an insect called the boll-weevil, led to a great cotton scarcity, and, under the stimulus of the high prices prevailing and of the necessity for ensuring plentiful supplies for the Lancashire mills, cotton-growing was commenced in many parts of the Empire. To-day the Empire production, though still comparatively small, is steadily increasing.

It will now be realised that the problem of the full development of the Empire is not by any means a simple one to solve, and that a consideration of Empire resources demands a knowledge not only of the local conditions in the different countries but also of their relative positions and of the means of communication between them.

THE COMMUNICATIONS OF THE EMPIRE

The existence of the Empire as a unit, political or economic, depends essentially on the maintenance of efficient communications between its members. Indeed the Empire may be said to be a product of the development of trans-oceanic communication, and its greatest growth has taken place since the introduction of steam navigation. General Smuts, emphasising the great

importance of maintaining personal contact, said "communications are of the essence of our Empire, and unless we succeed in solving some of the most urgent problems of more rapid and cheaper communications it will be almost impossible in the future to hold together this vast empire scattered over the whole globe." By "communications" he referred not only to the means of transport but every method of "keeping touch"—cables and wireless telegraphy and telephony, as well as ships and aircraft. Fortunately, big advances have recently been made in Empire communications, and the distances separating the countries of the Empire have, for all practical purposes, greatly diminished, while the possibilities for the future are immense.

Sea Routes.

Sea communications are the oldest and still by far the most important of all means of communication. The services are largely steamship services, the sailing-ship having now been almost completely superseded, and further, coal is giving place to oil as a means of raising steam, the oil-burning vessel having many advantages over the coal-consuming one. The chief of these are (1) that its heating value is about twice that of coal, (2) that by its use much storage space is saved or a greater radius of action can be obtained, and (3) that a great saving in labour is effected, as the furnaces can be manned by less than half the number of men required when coal is used. The steamship, however, is now tending to give place to the motor-ship, and many large cargo and passenger vessels driven by oil engines are now in use.

Ships may be divided into two broad classes, "liners" and "tramps." The former type of ship may be run either for cargo or for passengers, but in either case it runs "to schedule," the times of departure and arrival being advertised in advance, and the cargo liners thus experience the disadvantage of having to "sail" punctually whether fully loaded or not. Consequently they are used only on routes on which there is a regular demand for such traffic in both directions. Tramps, on the other hand, are not run according to a time-table but are simply hired when required to take a cargo from one port to another. They are thus not tied to any one route but can roam the oceans of the world, the owners directing their movements from home by cable or wireless as the possibilities of cargo arise.

The cargo liners and passenger liners are employed on what are known as direct service routes—unlike the tramps they call at ports *en route* only to land passengers and mails, and, on the longer routes, to obtain coal, or oil, and food.

THE CHIEF EMPIRE DIRECT SERVICES.—The shortest of the direct service routes of the Empire is that *from Britain to Canada*. In the summer the usual service is to Quebec and Montreal, but

in the winter, when the St. Lawrence is closed by ice, the Canadian ports served are Halifax or St. John, which are open all the year round. However, on account of the fact that the American ports of Portland and New York are nearer to Quebec than is Halifax, goods are frequently consigned *via* these ports to and from Canada during the winter months. The great cargo on this route is wheat.

Newfoundland, owing to its position, trades chiefly with Canada and the United States.

Most of the British ships calling at *West Indian ports* for cargo are *en route* for British Honduras, British Guiana, or the South American ports, but there are some direct sailings. On this route bananas are an important cargo, and special fruit boats, whose holds are fitted with refrigerator coils, are used in order to prevent the fruit from deteriorating on the voyage. The chief port in connection with British West Indian trade is Kingston, Jamaica, and most of the islands send their produce to it for shipment. The proximity of the islands, especially of the Bahamas, to North America, however, has resulted in a considerable direct trade with both the United States and Canada.

Several shipping lines have regular sailings to *India and the East*. Bombay is the chief destination for mail boats, as it is the nearest port to Britain and has easy access by rail to all parts of India. Colombo, the capital and chief port of Ceylon—aptly named “the Clapham Junction of the Orient”—is a great junction point for routes from Europe, Africa, Asia, and Australasia, and many ships proceeding to the Far East call there. (Fig. 14.) On this route cotton, tea, jute, oil-seeds, hides and skins are important cargoes.

Ships on the direct service route to *Australia* usually call first at Fremantle (Western Australia), the terminus of the overland route, to land or receive mails and passengers and to obtain supplies, and then proceed to Adelaide, Melbourne, or Sydney. Most of the ships returning direct to Britain from Australia use the Suez Canal, but a considerable number now return *via* the Cape of Good Hope. The latter route, though longer, enables the payment of the heavy canal dues to be avoided. The principal return cargoes are wool, wheat, hides and skins, ores, and, in special refrigerator vessels, meat and butter.

In the case of *New Zealand*, also, the quantity of the trade with the Mother Country is of sufficiently great dimensions to warrant direct services of ships. Actually, the shortest route is *via* the Panama Canal, but many of the ships use the Suez Canal or the Cape of Good Hope route on the outward voyage, and return *via* Cape Horn, which route is about a thousand miles shorter than that *via* Suez. The Panama route is some five hundred miles shorter than that *via* the Horn, but, except in the case of mail boats, the canal dues and the length of time needed to traverse it more than outweigh the advantage of distance. The

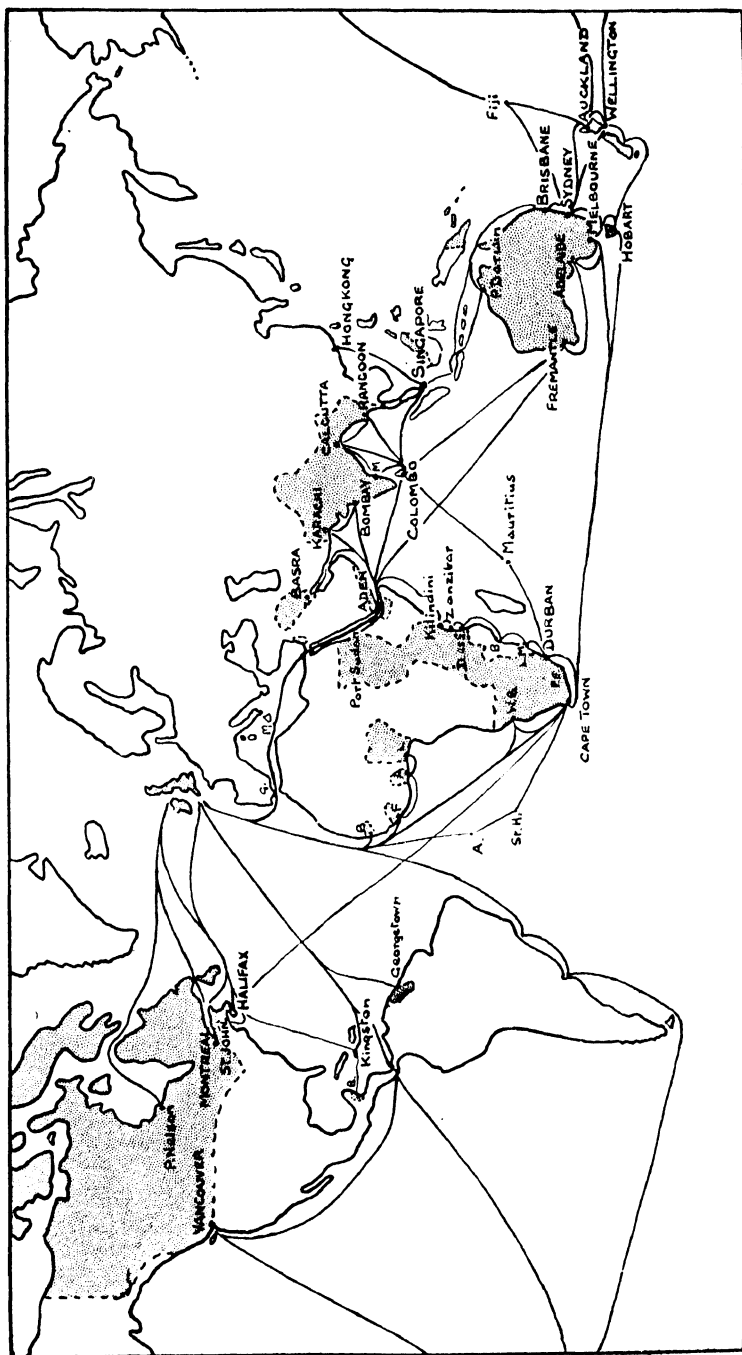


FIG. 14.—SEA ROUTES OF THE EMPIRE.

return cargoes from New Zealand are chiefly wool, wheat, frozen mutton, butter, and cheese.

INDIRECT OR CALLING SERVICES.—It is on these services that the tramp steamer plays a most important part. Its relation to the liner is much the same as that of a goods wagon to an express train, and it is able to solve many intricate shipping problems by its indirect homeward voyage.

South Africa has a direct service with Great Britain and a substantial traffic of its own, but the most valuable exports—gold and ostrich feathers—do not make freights, and wool and maize are seasonal exports. The liners, consequently, have to depend for their profits largely on the outward voyage, and the problem of the great difference between the bulk of the imports and the exports has to be solved by the tramp. Further, South African ports are served to a great extent by ships on their way to and from Australia and New Zealand.

South Africa is still largely an importer of those food-stuffs on which British ships rely for return cargoes, and ships which are not bound by a schedule have to scatter in search of freight.

There are two possible areas where heavy cargoes may be obtained—India and Australia—and the ships may therefore clear in ballast for either of these countries. The most probable voyage from South Africa, however, is to India, because not only does India offer cargoes for Europe, but she is prepared also to import coal, which is to be had cheaply at Durban. This factor greatly enhances the advantages of the return voyage *via* India and the Suez Canal. Australia, on the other hand, exports on the whole a much greater quantity of goods than she imports, and there is consequently a convergence of empty tonnage both from east and west; as Australasia is able to provide homeward cargoes for all British ships going outward in the direct trade, those ships entering in ballast are not required for cargo to the United Kingdom. They probably supply some of the tonnage necessary to take the traffic sent direct to the European continent, and probably also take cargoes of coal, which Australia exports in considerable quantities to India, the islands of S.E. Asia, New Zealand, and Chile.

On the *route to India* many of the ports are ports of call for the liners, but the bulk of the exports depend on the coasting steamer and the tramp. Beyond India, from *Burma to Hong-Kong*, the tramp steamer again plays an important part. From this area the exports are great both in bulk and variety, and the British regions consign them through collecting ports. Singapore serves this purpose for the Straits Settlements, Malaya, and Borneo; Hong-Kong collects from China and other non-British areas; and Rangoon from the Andaman and Nicobar Islands as well as from Burma. A considerable local trade is carried on, and among the chief cargoes for Britain are tin and rubber.

The great collecting port for the *Pacific islands* is Sydney, but Wellington and Auckland, in New Zealand, serve the same purpose. Several of these islands—notably Suva, in the Fiji Islands—are important ports of call, and coaling and oiling stations for vessels sailing on the routes from Australasia to North America.

The *East African ports* are served by coasting vessels using the Suez Canal route, and most of the trade is done through the collecting ports of Dar-es-Salaam, in Tanganyika Territory, Kilindini, on the island of Mombasa, in Kenya, and Zanzibar. On the other side of the continent, the *West African ports* also are served by coasting services, but Freetown, Sierra Leone, is a port of call for large liners on the Cape route. Freetown consequently acts as a collecting port.

Much valuable produce is exported from East and West Africa—notably, cotton, coffee, hides and skins from East Africa and cocoa, palm-oil, ground-nuts, and tin from West Africa.

Latitude and Longitude.

The position of a ship may be ascertained at any time by determining the latitude and longitude. *Latitude* is angular distance north or south of the equator, and is shown on a map by lines drawn round the earth parallel to the equator, known as “parallels of latitude.” *Longitude* is distance in degrees east or west of the Greenwich meridian, and is shown by halves of circles which are drawn round the earth at right angles to the equator. These half-circles are known as “meridians.”

Latitude is usually found by taking the altitude of the sun at noon, by means of a sextant, and comparing the result with tables given in the *Nautical Almanac*, which is carried by every ship. At night the chief method used in the northern hemisphere is to observe the altitude of the Pole Star, the height of this star above the horizon being equal to the latitude of the place from which it is taken.

Longitude is determined by comparing local, or ship's time—obtained by observing the position of the sun—with Greenwich time—as shown by the ship's chronometer. Since the sun can never illuminate the entire earth at one time, it is plain that time must “follow the sun”: that is, it cannot be the same time all over the world—or even in places only a few hundred miles apart, unless they are situated in the same longitude—at any given moment.

As the earth revolves through its entire 360° of longitude in 24 hours, it turns in 1 hour through $\frac{360}{24}^\circ$, or 15° ; therefore it turns 1° in $\frac{60}{15}$ minutes, or 4 minutes. It follows that for every degree of longitude there is a difference of 4 minutes in the time according to the sun. Also, as the earth turns from west to east, places east of the Greenwich meridian will see the sun before

places in the same longitude as Greenwich, so that their time will be in advance of Greenwich time. On the other hand, places west of the Greenwich meridian will not see the sun till after places on that meridian, so that their time will be behind Greenwich time. Thus, if the ship's time is found to be 11 o'clock and Greenwich time is 12 o'clock, the longitude of the ship will be 15° west of Greenwich (expressed as 15° W.). If the ship's time is 1 o'clock, the longitude of the ship will be 15° east of Greenwich (15° E.).

From the latitude and longitude so determined the position of the ship can be plotted on a map of the world.

The International Date Line.

It will be realised that the differences in time between places lying east and west on the great continents of the world might well lead to much confusion. For purposes of convenience, therefore, places in the same neighbourhood observe the noon of one fixed place, *e.g.*, Greenwich in the United Kingdom, Paris and other places on the Continent, and so on. As the earth takes 24 hours to revolve on its own axis it is obvious that some places will be 12 hours earlier than, *e.g.*, Greenwich, and some places 12 hours later. That is, between some places there will be a difference of 24 hours in time. Imagine the meridians of 180° E. and 180° W. as two parallel lines almost touching each other, then when it is noon at Greenwich it is midnight of the previous day at 180° W., and midnight of the same day at 180° E. So that at one and the same place, it is the same time of day, but there is a difference of exactly one day as to the date. If a traveller proceeding round the world kept a careful record of the time and date throughout his journey he would find that—as happened in Jules Verne's famous book *Around the World in Eighty Days*—unless the necessary adjustment had been made, there would be a difference of one full day of 24 hours between his time record and that of the place from which he started, *i.e.*, his time would be correct but he would be a day out as regards the date. In going east, travelling in the direction of the rotation of the earth, or “against the sun,” one *loses* four minutes for each degree of longitude traversed, and in going west one travels “with the sun” and *gains* four minutes for each degree. (Fig. 15 will help to make this clear.)

Confusion would naturally be created unless some international scheme for adjustment were adopted, and so we have what is known as the *International Date Line*. This follows—with modifications so as to avoid passing through land—the course of the 180° meridian. Here, when a ship is crossing from west to east, a day is lost: for instance, if the line is reached and crossed at midnight on Saturday, the time is adjusted to midnight on Sunday. Also, in the same way, if a ship passes over

from east to west a day is gained ; e.g., if when it reaches and crosses the line the time is midnight on Sunday, the time will have to be adjusted to midnight on Saturday.

Maps.

At this stage some space may advantageously be devoted to the consideration of maps. In the case of relatively small areas,

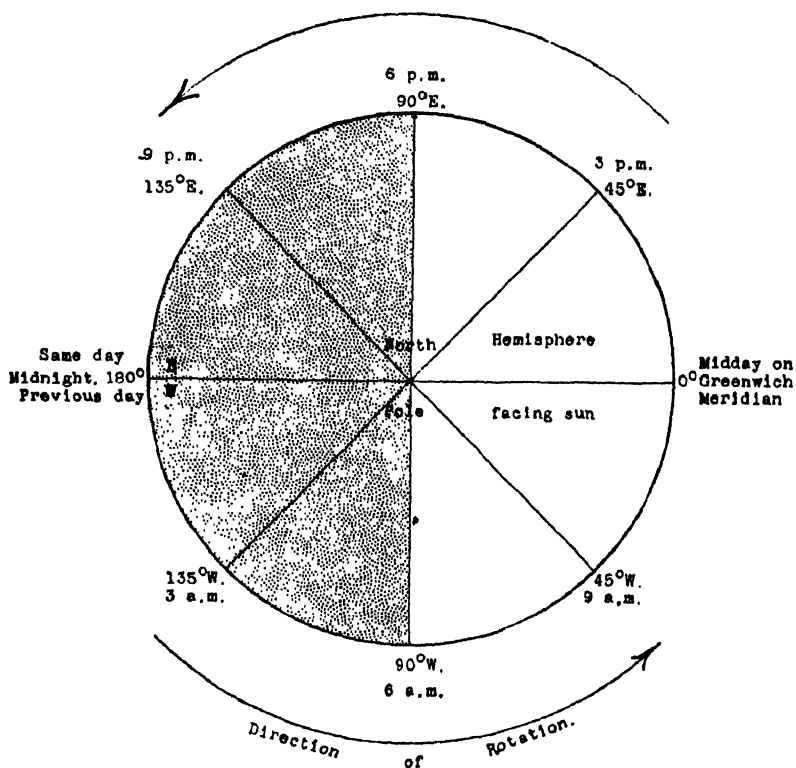


FIG. 15.—DIAGRAM ILLUSTRATING THE RELATIONSHIP BETWEEN LONGITUDE AND TIME.

maps may be sufficiently accurate for all ordinary purposes, but the two chief kinds of world map each have important disadvantages which are apt to give an entirely incorrect idea of the earth as a whole, though certain features are correctly shown. Indeed, the map of the world that gives the most correct impression is that depicted on the globe. The difficulty in map-making is to project a spherical surface on to a plane. As this cannot be accomplished so as to give an entirely accurate representation, map-makers have to be satisfied with methods which reduce the inevitable inaccuracies to a minimum. It

is not necessary to consider here the ways in which maps are made, but as the study of the atlas is such an important part of the study of geography, it is necessary to know and bear in mind the merits and demerits of the two most common map-projections.

MERCATOR'S PROJECTION.—Maps prepared on this projection represent the earth as a rectangle. (Fig. 14.) All meridians, *i.e.*, lines of longitude, are shown as parallel instead of meeting at both poles as they actually do, and the parallels of latitude (running parallel to the equator), which really are equidistant from each other, are shown as getting farther apart as they approach each pole, and the north and south poles, which are really points, appear as lines as long as the equator.

Obviously the defect of this projection is the great distortion it makes of areas far from the equator: for example, Siberia and Alaska appear to be twice the size they actually are, and Greenland appears slightly larger than South America, when in reality it is only about a twelfth as big.

The value of this method is its great use for navigation—except for the polar regions. As the map is made up of right angles, all bearings are true and exact. A straight line joining any two points on a Mercator's map is a line of constant bearing, but, as will be explained presently, it is only along the equator and the meridians that a straight line on a Mercator's map represents the shortest distance between any such two points.

MOLLWEIDE'S PROJECTION.—A map drawn on this projection resembles an egg lying on its side. (Fig. 9.) The central meridian (that through Greenwich being generally accepted as such) is shown as half the length of the equator and at right angles to it, and this is in fact correct. However, the distance between consecutive parallels of latitude, instead of remaining constant, decreases slightly as the poles are approached, and the meridians, instead of appearing as straight north and south lines, are curved—that of 180° being greatly misrepresented. Thus, Africa and Europe are well shown, but Australia and North America, being on the margins, are distorted. The areas, however, are all truly represented (*cf.* Greenland and South America), and maps drawn on this projection are consequently of value for showing the distribution of vegetation or other natural phenomena. As, unlike those drawn on Mercator's projection, they are not true as regards direction, they are not suitable for showing the direction of winds and ocean currents.

Great Circle Sailings.

Owing to the spherical shape of the earth, the shortest distance between any two points on the earth's surface is along the arc of a circle passing through them whose plane passes

through the centre of the earth. Such a circle is called a "Great Circle." Thus lines of longitude, or meridians, are all great circles; lines of latitude, however, with the exception of the equator, are not. As has already been pointed out, therefore, it is only when a ship's course lies along the equator or a meridian that it will represent a great circle sailing on a map drawn on Mercator's projection. Elsewhere, if the shortest course is followed, it will show as a curve towards the polar regions—greater or less according to the direction and latitude—though in reality it appears on the globe as a straight line, and, contrary to what one would be led to expect from a study of the map of the world, the parallels of latitude are not followed by ships.

Among frequented ocean routes, those of the North Pacific show the most marked deviation from the parallels of latitude, for it is here, where very wide stretches of ocean have to be crossed between the ports of North America and eastern Asia, that there is the most conspicuous opportunity for taking advantage of great circle routes. For instance, though Yokohama is in a more southerly latitude than San Francisco, a steamer proceeding to Yokohama from San Francisco begins by steaming north-westwards, and describes a curve which rises to about 48° N., and the route from Vancouver to Yokohama passes just south of the Aleutian Islands.

Great circle routes are not always possible for various reasons, *e.g.*, in the North Atlantic there is the danger of icebergs. The same difficulty is experienced if such a route is followed from Cape Town to Australia. Vessels travelling under steam from Australia to South Africa travel northwards and take an even longer course than that of a circle of latitude, in order to avoid the prevailing "westerlies." The extra mileage is compensated for by a saving in fuel. Vessels going through the Panama Canal for Yokohama and the North Asiatic ports cannot follow Great Circles, for the circles cross a large part of the North American continent. Again, coaling-stations are not always convenient on Great Circle routes, and a detour is often advisable to avoid carrying large quantities of bunker coal.

Coaling and Oiling Stations.

As it is generally impossible for adequate supplies of fuel to be carried on the long journeys, it will be realised that ships must be able to replenish their coal bunkers or obtain fresh supplies of fuel oil or engine oil at convenient places on the great trade routes of the world. Thus the refuelling stations which have been set up at frequent intervals along the trading routes are of great importance.

The Chief Imperial Refuelling Stations

HOME PORTS

Both Coal and Oil

Birkenhead	Liverpool
Brixham	London
Dublin	Manchester
Glasgow	Newcastle
Grangemouth	Southampton
Hull	Sunderland
Leith	Swansea

Coal Only

Aberdeen	Exeter	Penarth
Ardrossan	Falmouth	Plymouth
Ayr	Greenock	Portland
Barry	Grimsby	Portsmouth
Belfast	Hartlepool	Port Talbot
Berwick	Holyhead	Queenstown
Blyth	Kingstown	Shields (North and South)
Boston (Lincs.)	Larne	Tynemouth
Bristol	Limerick	Waterford
Cardiff	Londonderry	Wearmouth
Cork	Middlesbrough	Wexford
Dartmouth	Milford Haven	Whitehaven
Dundee	Newport (Mon.)	Wigtown

Oil Only

Avonmouth	Granton
Barrow	Jarrow-on-Tyne
Barton	Portishead
Dover	

(From the above it will be seen that the British Isles are extremely rich in refuelling stations—particularly for coal. This is an exceedingly important asset in view of our great dependence on sea-borne commerce.)

MEDITERRANEAN PORTS

Both Coal and Oil

Gibraltar	Malta
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ATLANTIC PORTS (NORTH AND SOUTH)

Both Coal and Oil

Bermuda	Quebec
Cape Town	St. John (New Brunswick)
Halifax (Nova Scotia)	Sydney (Cape Breton Island)
Montreal	Trinidad

Coal Only

Barbados	St. Helena
Falkland Islands	St. John's (Newfoundland)
Gambia	St. Lucia
Kingston (Jamaica)	Sierra Leone
Lagos	Simon's Town
Nassau (Bahamas)	

PORTS OF THE RED SEA, INDIAN OCEAN, AND CHINA SEAS

Both Coal and Oil

Aden	Madras
Bombay	Mombasa
Calcutta	Penang
Colombo	Perim
Durban	Port Sudan
Fremantle	Rangoon
Hong-Kong	Singapore
Karachi	

Coal Only

Galle	Seychelles
Labuan	Trincomalee
Mauritius	Zanzibar
Sarawak	

Oil Only

Abadan (Iraq)

PACIFIC PORTS (NORTH AND SOUTH)

Both Coal and Oil

Adelaide	Vancouver
Melbourne	Victoria (British Columbia)
Seattle	Wellington
Sydney (N.S.W.)	

Coal Only

Albany	Lyttelton
Auckland	Nelson (New Zealand)
Brisbane	Newcastle (N.S.W.)
Bunbury	Otago
Dunedin	Port Pirie
Esquimalt	Suva (Fiji Islands)
Greymouth	Thursday Island
Hobart	Townsville
Invercargill	Wallaroo
King George's Sound	

Air Communications.

The great importance of the development of means of rapid communication within the Empire has already been emphasised. Not only is close economic co-operation between the countries of the Empire made more possible by the speeding up of communications, but rapid movement between them leads to easy interchange of ideas and opinions and more firmly welds them into one great political unit.

The aeroplane services within the Empire are rapidly expanding, already there is a regular service from Cairo, *via* Palestine and Iraq, to Karachi, in India,¹ and it seems probable that this service will be extended to Bombay, Calcutta, Rangoon, Singapore, and the ports of Australia within the next few years. In the Dominions, aeroplane services are being developed, and in Australia, particularly, there is great scope for the utilisation of this form of transport, her poor land communications and her favourable climate making for the success of air transport development. A line now "runs" for a distance of some 1,400 miles along the west coast from Perth to Derby. Another important line links up the inland termini of the railways from the east coast to the interior in the north-east, and lines are operating in the south-east of the country, between Melbourne and Adelaide.

In Canada, not only is aircraft used as a means of rapid communication, but also for other important purposes. The immense tracts of forest, extremely difficult to safeguard from fire, are by the use of aeroplanes brought under a system of observation which enables fires to be located and extinguished in their early stages. Again, many great areas, hitherto unsurveyed owing to the difficulties of transport, have been accurately mapped by means of photographs taken from the air.

The airship, however, is probably the most likely solution to the problem of quickening transport communications between Great Britain and the Dominions, as it has a much wider radius of action than has the aeroplane and can cover long distances without having to land. The wide expanse of ocean between Great Britain and Canada and between South Africa and Australia will always make these routes unsuitable for the aeroplane. Probably in the future the aeroplane will be confined to the comparatively short routes, and will co-operate with the airship, acting as a fast collector and distributor in connection with the airship services.

Fig. 16 shows the existing and proposed air transport routes of the Empire, and indicates the great future value of aircraft in binding the countries of the Empire more closely together.

¹ At the date of publication (September, 1927), though there is a weekly service from Cairo to Basra, the service from there on to Karachi is not in operation, on account of the opposition of the Persian Government. Unless their attitude is altered, it seems that the route from Basra will follow the southern, instead of the northern, shore of the Persian Gulf.

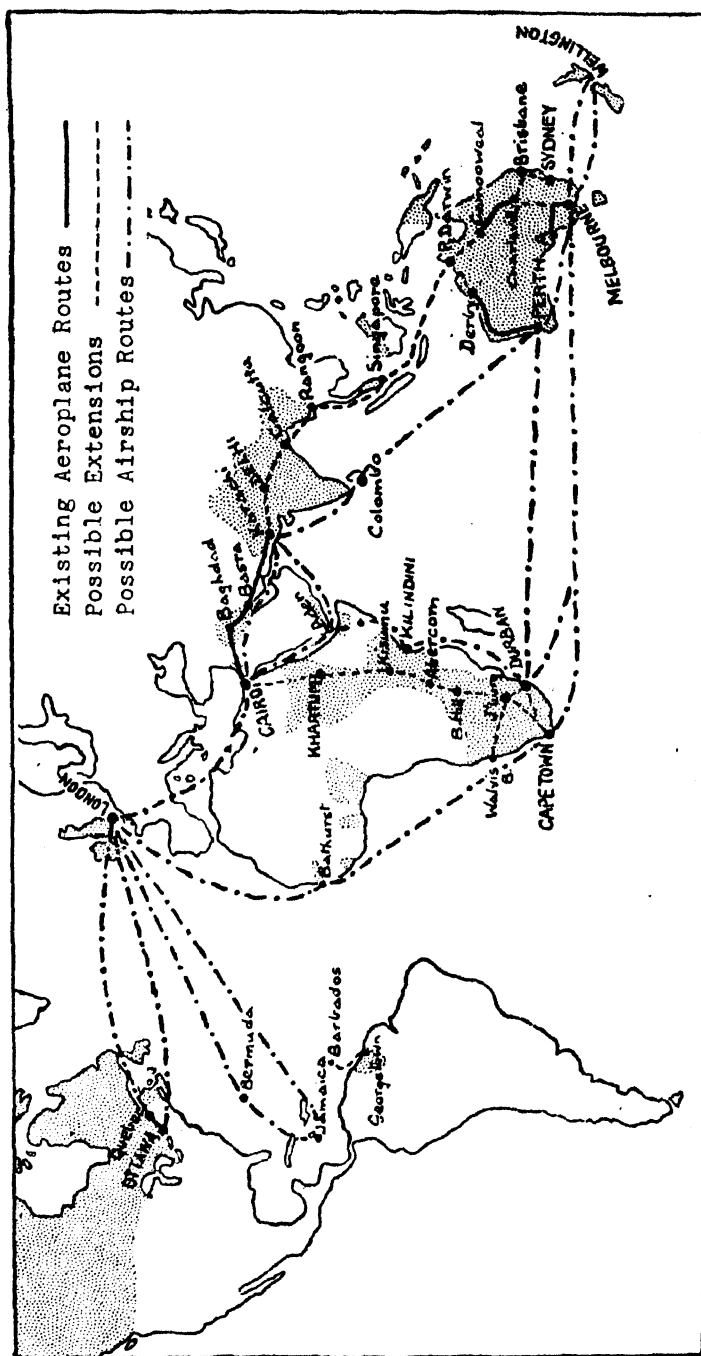


FIG. 16.—EXISTING AND PROPOSED AIR TRANSPORT ROUTES OF THE EMPIRE.

Cables and Wireless.

CABLES.—Of a total length of submarine cables in the world of 325,000 nautical miles, more than sixty per cent. is owned by British companies. The British system is therefore of enormous importance; it has, indeed, been one of the most powerful bonds of Empire. Even with the advent and development of wireless, the cable has retained most of its importance, and shows no sign of being superseded. It has, at present, the great advantages over wireless, of secrecy and reliability.

A study of the map will show that British cables encircle Spain and cross the Mediterranean and the Red Sea. They link Egypt, India, and Ceylon, pass through the Malay Straits, and go north to China and south to Australia and New Zealand. They surround Africa and provide alternative routes to Asia and Australasia *via* the Cape. They traverse the Atlantic through the Azores, to Canada, the West Indies, and South America.

From the strategic point of view, however, the most important cables are those which are not only British owned but which touch only at British ports, and, as the cables are most vulnerable to enemy action where they come to land, the situation of the cable stations is of great imperial importance. The "all red" cable routes are, therefore, of particular value.

The "all red" routes may be dealt with briefly as follows:—

From Porthurno, in Ireland, a cable runs to Harbour Grace, in Newfoundland. From Newfoundland there is a cable to Halifax, in Nova Scotia, from whence the "all red" route continues, *via* Bermuda and the Turks Islands, to Kingston, Jamaica—the junction for all British West Indian cables.

There are, strictly, no "all red" routes to the East *via* the Mediterranean, for the cable station of Suez no longer lies within the Empire. To include the Suez routes as "all red" it is, therefore, necessary to regard that station as secured to us by British naval power in the Mediterranean and Red Sea and by British influence in Egypt. From Britain to the East, the route runs *via* Gibraltar, Malta, Suez, Port Sudan, Perim, and Aden, to Bombay and Colombo. Continuing east, the route runs from either Colombo or Madras, *via* Penang and Singapore, direct to Hong-Kong, or *via* Labuan to Hong-Kong.

The "all red" route to South Africa branches from the route to India at Aden, and proceeds *via* Zanzibar, the Seychelles (from which there is a cable to Colombo), Mauritius, Durban, and Algoa Bay to Cape Town.

To Australia there are two "all red" routes. The first leaves the South African route at Mauritius and runs *via* Rodriguez and the Keeling Islands to Fremantle. The second connects Canada with Australia across the Pacific and runs from Bamfield, in British Columbia, *via* Fanning Island, and Suva (Fiji Islands), to Norfolk Island, where it branches, one

route running to Southport, near Brisbane, in Queensland, and the other to Doubtless Bay, near Auckland, in New Zealand. In addition to the connection between Australia and New Zealand *via* Norfolk Island, there is direct cable communication from Sydney to Wellington and Auckland.

WIRELESS.—"Although wireless is likely to have a marked influence on the development and extension of the cable and land-line system in the future, and may even in some cases supersede the latter, both systems are essential if we are to obtain full advantage of the implements of communication which science has placed at our disposal. The introduction of the motor-car has not resulted in the scrapping of the tram lines. Nevertheless, it is an indisputable fact that had the motor-car never been invented the tramway systems would have been developed to a greater extent than has actually been the case. But what is far more important is that the additional facilities offered by motor transport have enormously increased the trading capacity of the world, thereby creating a still greater demand for transport facilities of all kinds.

"In the same way the introduction and perfection of wireless telegraphy and telephony have not resulted in, and are not likely to result in, the scrapping of the land-line networks and cable systems of the world. But while it will undoubtedly influence the future extension of the cable system, by far the most important effect it will have will be to increase the trading facilities of the world."¹

The development of wireless communications within the Empire has proceeded rapidly since the war, and many high-power stations have been erected to provide direct communication between the various parts of the Empire. However, the discovery of what is known as "beam wireless"—by which the wireless messages may be transmitted particularly in the direction of the receiving station (*i.e.*, along a great circle route)—is likely to be revolutionary in its effects, as high power stations are not required for transmission over long distances by this method and the capital outlay required for the erection of stations is much reduced. The erection of beam wireless stations is now proceeding rapidly throughout the Empire, and Puck's boast that he would "put a girdle about the earth in forty minutes" would be a very poor boast to-day. The countries of our far-flung empire are now within seconds of one another, and a wireless message could be flashed round the world within the Empire in a very few minutes.

¹ *The Resources of the Empire: Communications*, by W. T. Stephenson.

CHAPTER V

THE BRITISH ISLES

POSITION AND PHYSICAL CONDITIONS

If a globe is held in such a way that as much land as possible can be seen, it will be observed that the British Isles lie in the centre of the great land masses of the world. (Fig. 17.) Situated



FIG. 17.—THE LAND HEMISPHERE.

in the north temperate zone, they lie off the western margin of the great continent of Eurasia, which extends eastwards half-way round the globe. To the south the continent of Africa extends well beyond the equator, and to the west, across the Atlantic Ocean, lie the continents of North and South America. It will be seen also that the British Isles have direct connection with all the great oceans of the world. The world position of our islands is, therefore, a very favourable one.

But the situation with regard to Europe is also of great importance. In the first place, the marginal position she enjoys

gives Britain a climatic advantage over the European countries within the same latitudes but lying farther east and farther from the sea, for she has a much more equable climate than they. Secondly, while in the Middle Ages, when the commerce of the world was carried on chiefly round the shores of the Mediterranean Sea, Britain lay on the *edge* of the commercial world, with the development of American trade, the world's commerce has centred in the North Atlantic, and she now lies at the very *centre* of the world's economic activities, between the great commercial and industrial regions of Europe and the eastern United States.

Her insular position, too, has been of untold benefit. It has always protected her from invasion and from the spread of infectious diseases from the mainland, and yet the narrow seas have never acted as a barrier to beneficial influences, but indeed have facilitated intercourse with people of older and more advanced culture; they have allowed us to learn much from our neighbours without becoming unduly involved in their disputes and have permitted of such undisturbed interior progress as no continental country has enjoyed.

A further great advantage of the British Isles is their position, in shallow seas, on the European "*continental shelf*"—a submerged platform extending north-westwards from the Continent. (Fig 18.) This has given us valuable fishing grounds and the benefit of the high tides which are of such great utility in flooding our harbours and carrying ships far up our estuaries.

Climate.

TEMPERATURE.—As the British Isles are between latitudes 50° and 60° N., they lie within the region of the westerly winds throughout the year. These winds blow almost all the year from the west and south-west from over the North Atlantic—unique among the oceans of the world in its temperature conditions. In it the Gulf Stream, a mighty current of relatively warm water, flows from the south-west towards the north-east, and from this the Westerlies, themselves warm and moist through contact with it, drive to our shores a great volume of water—the North Atlantic Drift—which spreads over the north-eastern part of the Atlantic as a relatively warm surface-layer. This envelops the British Islands in the winter in a gulf of warmth when lands within the same latitudes (*e.g.*, Labrador and Central Russia) are ice-bound. At this season the air over the islands is as much as 30° F. above the mean temperature of the latitude throughout the whole of the northern hemisphere. In the summer, on the other hand, these winds are relatively cool. As a result of these influences, the climate of this country is equable. No town of the British Isles has a mean temperature for January (the coldest month of the year) below freezing-point,

and in no part does the mean temperature for July (the hottest month) exceed 65° F.

In winter, therefore, the warmth we experience comes mainly from the sea and the temperature decreases from west to east, at this season the whole west coast from the north of Scotland

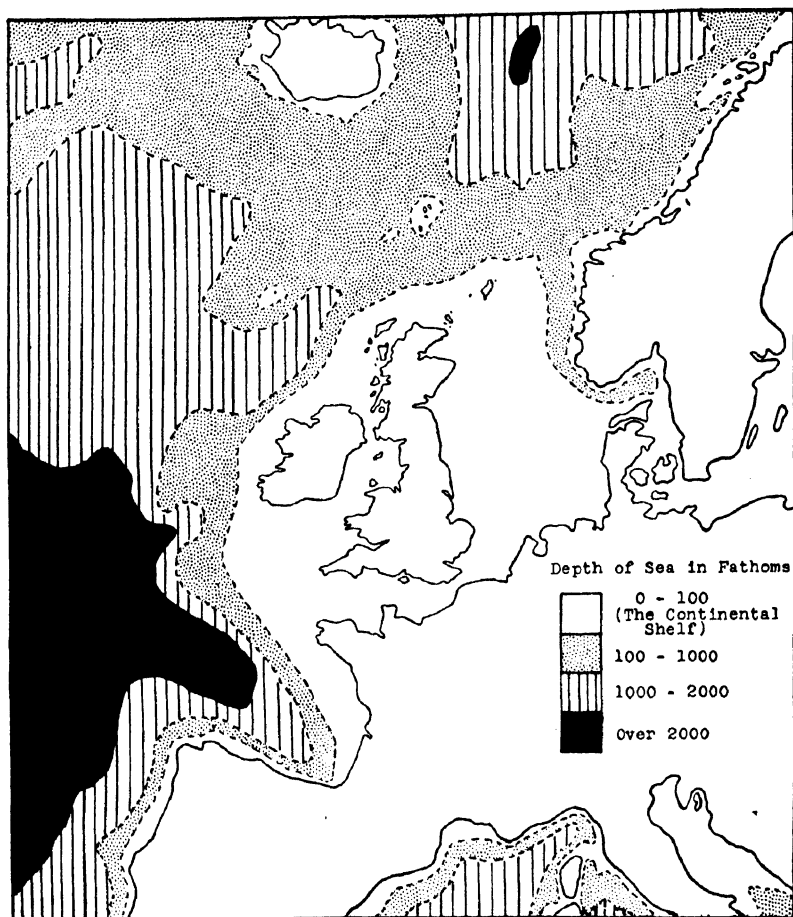


FIG. 18.—THE CONTINENTAL SHELF OF EUROPE.

to the Isle of Wight experiencing the same temperature conditions. In the summer, however, the warmth of the region is due much more to the influence of the sun than the sea and the south is warmer than the north, the temperature experienced decreasing with increases in latitude. For these reasons the western parts of the islands are more equable than the eastern parts, which are *relatively* extreme, especially in the south-east round London.

RAINFALL.—Besides being of such great value as carriers of warmth, the westerly winds are responsible for the plentiful rainfall of our islands. In the flow of air of which they are composed are numerous travelling *depressions*, one of which reaches the British Isles on an average every ten days, though they are much more frequent in winter than in summer. Each of these

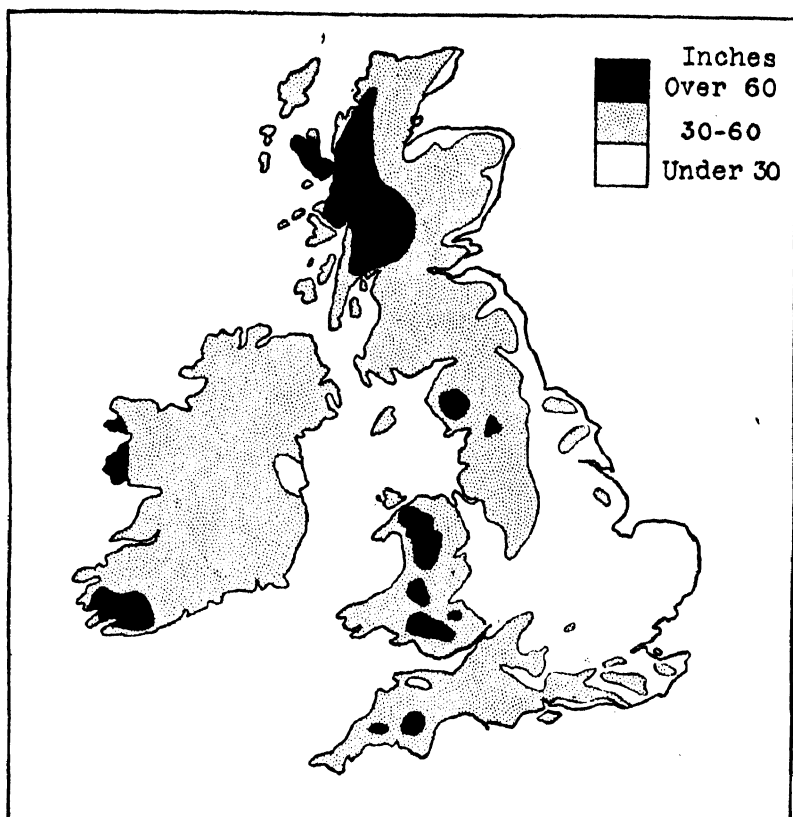


FIG. 19.—THE MEAN ANNUAL RAINFALL OF THE BRITISH ISLES.

depressions consists of a centre of relatively low atmospheric pressure into which the surrounding air swirls in an anti-clockwise direction, ascending when it reaches the centre, cooling with expansion and releasing its moisture in the form of rain, hail or snow as it does so. Thus our rains, like those of all countries lying within the region of the westerly winds, are cyclonic in character and are not so dependent on the effect of high land in forcing the air to rise as are those of lands within the trade wind regions. Though mountains and hills lying across the path of the winds cause an increased precipitation, regions where no

hills are present receive an adequate rainfall. Another important effect of the cyclonic storms we experience is that, as the air moves into the centre from all directions, the area affected by them may receive winds from any point of the compass. It is for this reason that though our islands lie throughout the year in the region of the westerly winds, in January, when depressions are most prevalent, 24 per cent. of the wind directions are between south-east and north-east—cold winds drawn in from over the continent.

The depressions which reach the British Isles travel in the general direction of the westerlies, *i.e.*, from west to east, but also follow well-defined tracks. Of these the most frequented lies along the western border of the islands, from the south-west, up the coast to the north of Scotland and past the mouth of the North Sea. It is in the west of the islands that the chief uplands lie and these increase what would in any case be an abundant rainfall. So that the rainfall of the British Isles diminishes from west to east, and while there is a heavy rainfall over the western portions of both Great Britain and Ireland—heaviest where the high land lies near the coasts—even to the east of the high land and over the eastern lowlands of England there is no lack of rain. (Fig. 19.)

The depressions (*i.e.*, temperate cyclones) of our latitudes have their converse in what are called anti-cyclones or “highs.” These are systems of high atmospheric pressure from which light winds blow outwards. As the air descends in the centre, anti-cyclones are associated with dry, fine weather with clear skies.

Physical Features.

The outline of the islands is very irregular, especially on the west, and the coastline is consequently long in comparison with the area. As a result of the indented nature of the coast no place in the British Isles is more than 70 miles from navigable water or 100 miles from the sea, and this has important beneficial effects on both commerce and climate. In the former case the cost of transport is greatly reduced, as ships can penetrate far inland, thus minimising the necessity for rail transport, and, in the latter, the tempering influence of the sea is enabled to penetrate to every part of the islands. Also the indentations in the coastline provide many excellent harbours. It is not surprising, therefore, that the Britons should have responded to the natural advantages of the islands and become a race of seamen, and that our Mercantile Marine should have grown to such an enormous extent.

The surface of the British Isles is unmarked by any high mountains, and few parts of the islands rise above 2,000 feet in height. In Great Britain the high land is found chiefly in the north and west, the south and east being comparatively flat.

If a line be drawn on a physical map from the mouth of the River Exe to Whitby it will be found to divide the country into two very different regions. North and west of the line the land is mainly hilly and comparatively barren; south and east of it the land is low-lying and fertile. This has a marked effect on the distribution of the agricultural industries and, before the Industrial Revolution, had a no less marked effect on the distribution of the population. Where plains are found north of this line—as the Cheshire plain and the lowlands of Scotland—it is as an exception to the general conditions. In Ireland, the lowland lies in the centre of the island and is surrounded by a broken line of high land near the coastline which, unfortunately, drains into the lowland, where innumerable bogs are formed.

The chief surface features of the British Isles, therefore, may be dealt with under the following headings: *The surface features of Scotland, viz., the Highlands, the Lowlands, and the Southern Uplands; the surface features of England and Wales, viz., the Pennines, the Cumbrian Hills, the Welsh Uplands, the Highlands of Devon and Cornwall; and the English plain; and the surface features of Ireland, viz., the Central Plain and the Coastal Mountains.*

THE SURFACE FEATURES OF SCOTLAND.

The Highlands, massed in two main groups, extend southwards as far as a line connecting the mouth of the Clyde with Stonehaven, where a sudden change of rock, due to a fracture or "fault" in the earth's surface, occurs. The surface is very uneven, and while many mountain peaks rise above the general level of the country, there are many very deep valleys known as "glens." This region is the wildest and most desolate part of the British Isles. Its mountainous nature, the relative infertility of the soil, the heavy rainfall and the comparatively low temperature—an important effect of the altitude—combine to make it of little value for cultivation, and to reduce its utility for pastoral purposes. The region is, therefore, thinly populated, and, as there are no minerals, has few industries. There is, however, considerable water power available, and this is taken advantage of at the Falls of Foyers and Kinlockleven for the generation of electricity for the extraction of aluminum, from local clays and also from clays imported from France and Ireland. Even the glens, though sheltered from the severe effects of the climate, are of little agricultural importance, as the heavy rains carry away any loose soil.

The Highlands, which offer a steep front to the Atlantic and a long gentle slope to the east, are divided into two parts by a very narrow but deep rift valley, called Glenmore, running from south-west to north-east and containing three long, narrow lakes, of which the largest is Loch Ness. These have been connected to form the Caledonian Canal. To the north of

Glenmore are the Northern Highlands and to the south, the Grampian Highlands, which drop to the lowlands along the fault-line in the rock to the south, almost parallel to Glenmore.

The west coast of the Highlands is high and rugged and much broken by long, deep inlets, enclosed by high mountain walls, similar in character to the fiords of Norway. Off this coast are the Inner Hebrides, a group of islands the chief of which are Mull and Skye, whose beauty attracts many tourists. Of the Outer Hebrides, which, as their name implies, lie beyond the inner fringe of islands, the largest is Lewis-Harris, on which stands the small town of Stornoway, an important fishing centre. Economic conditions here, too, are severe, for the soil is poor and in some parts boggy, supporting some cattle and sheep and the hardier cereals, oats and barley. The famous Harris tweeds provide occupation for those cottagers who are not engaged in the whisky distilleries or fisheries, and peat is the only fuel.

Off the north-east coast lie the Orkneys and Shetlands. In both these groups of islands fishing is an important industry, and cattle, sheep and ponies are reared, while cottage woollen industries offer a supplementary source of income.

On the east of the Highlands is a coastal plain which contrasts with them in almost every way. It is low-lying, fertile, experiences a low rainfall and a comparatively high temperature in summer, and is very favourable both for the cultivation of crops and the rearing of cattle and sheep. In this region there are several important coastal towns acting partly as agricultural centres and partly as fishing ports. Of these the chief is Aberdeen, which has, in addition, an important granite-exporting industry.

The Lowlands lie in a rift valley, i.e., a valley caused by the sinking of the land between two faults. The southern of these fault lines runs from Girvan to Dunbar, the northern has already been traced. In this rift valley are found four-fifths of the total population of Scotland and the region is by far the most important of the whole country.

It must not be supposed that the Lowlands consist of a great plain; most of the area is low-lying, but there is a broken line of hills in the north, running from west of Glasgow to the east coast near Montrose, and near the southern boundary are other uplands.

Between the northern line of hills and the Grampian Highlands lies Strathmore (i.e., the Great Valley). This fertile valley is widest in the east, to the north of the Ochil Hills and the Sidlaw Hills, and has an important extension, the Carse (i.e., garden) of Gowrie, along the northern bank of the estuary of the Tay, which, sheltered on the north by the Sidlaws, grows large quantities of fruit for the Dundee jam factories.

The lowlands are well watered by the rivers Ayr, Clyde, Forth, and Tay, the three last having fine navigable estuaries, and transport by river, canal, road and rail has been rendered

easy. Valuable supplies of coal, iron and oil shale are present in the region, and it has many important industries.

The Southern Uplands occupy most of southern Scotland. They are not as lofty as the Highlands and consist of gently rounded hills covered mainly with heather, bracken and coarse grass. They present an unbroken front to England and render access to Scotland difficult except by way of the narrow coastal plains and river valleys.

By far the most important part is the valley of the River Tweed. This separates the Lowther Hills on the north from the Cheviots on the south and, owing to the large numbers of sheep reared on the Uplands, has become the seat of an important woollen industry. The south coastal plain, however, is very fertile and provides excellent pasture for cattle.

THE SURFACE FEATURES OF ENGLAND AND WALES.

The Pennines, a belt of mountainous moorland running north and south, forms the backbone and watershed of northern England. On the north it is separated from the Cheviot Hills by the valley of the South Tyne—the break in the hills being known as the Tyne Gap. On the west the range is connected, at one point, with the Cumbrian group of hills by a ridge of land, some 1,000 feet in height, called Shap Fell. Elsewhere it is separated from it by the valley of the Eden, extending to the north, and by that of the Lune, which extends to the south. Farther south, the Pennines are almost cut in two by the valley of the river Aire, the partial divide being known as the Aire Gap, but they extend southwards until they terminate in the Peak District of Derbyshire.

Parts of the lower slopes of the Pennines form valuable sheep pastures, but agriculture is confined to the river valleys. On both flanks there are well-developed coalfields supporting great manufacturing industries.

The Cumbrian Hills lie in the north-west of England to the west of the Pennines. Once a great dome of rock, the region has been broken up into a mass of hills separated by deep valleys containing many beautiful lakes. The Lake District is, like the Peak District, a favourite resort of tourists, and hotel towns, such as Ambleside, Grasmere and Keswick, have sprung up to cater for them. In the north-west of the region, extending to the coast, and, indeed under the sea, is a small coalfield.

The Welsh Uplands are separated from the Pennines by a belt of lowland across which flow the Dee and the Mersey, and they extend with little interruption, but for that of the long river valleys, from the north of Wales almost to the south and from the west to the east. They leave only a narrow coastal plain which, however, broadens out somewhat in the south along the Bristol Channel.

Sheep-rearing is the chief occupation of the few inhabitants

of the uplands, but slate is an important product of the Snowdon region. In the south, on the coalfield, which supports many important manufacturing industries, there is a dense population.

The Highlands of Devon and Cornwall can be divided into three groups: Dartmoor in South Devon, Exmoor in North Devon and the Cornish Heights. These are nowhere higher than about 2,000 feet and rise much more gently than the hills of Wales or Cumberland. The soil of the uplands is comparatively infertile, and the population is gathered chiefly round the coasts and in the river valleys, where the soil is rich. Here pastoral and agricultural industries, including fruit and dairy farming, are important and the broad river mouths and numerous coves afford shelter for the fishing fleets.

The granite of the hills contains veins of tin and copper, and mining for these minerals has been carried on from very early times. Where the granite has weathered down, valuable deposits of kaolin, or china clay, are found.

The English Plain occupies practically the whole of the rest of England. There are, however, several minor uplands even south and east of the line from the mouth of the Exe to Whitby. A ridge of limestone, with its steep face (or scarp) towards the west and north-west and a gentle slope to the south and east, runs in a curved line from the mouth of the Exe to the mouth of the Tees. Its outstanding features are, from south-west to north-east, the Blackdown Hills, the Cotswold Hills, Edge Hill, the Northampton Heights, and the North York (or Cleveland) Moors.

Roughly parallel with this line of limestone hills runs a similar series of chalk hills on the south, commencing in Dorset and ending at Flamborough Head in Yorkshire. These are, from south-west to north-east, the Dorset Downs, the Marlborough Downs (sometimes called the White Horse Downs), the Chiltern Hills, the East Anglian Heights, the Lincolnshire Wolds, and the Yorkshire Wolds.

Between these two lines of hills is a fertile clay plain which is an important agricultural and pastoral region. From the Plain of the Midlands run two branches, one forming the Cheshire Plain and the other the Plain of York. On the east of the Pennines, the plain is broader and is crossed by several rivers which go to form the Yorkshire Ouse, which, with the Trent, flows into the Humber. On the western side it is crossed by the rivers Ribble, Mersey and Weaver. Both these plains provide natural routes to Scotland, and, on this account, as well as because of their fertility, they have always been important. York, a prominent centre, even in Roman days, is now a large railway junction and railway repair shop.

In the south-east there are two other chalk ridges. The ridge of the North Downs runs westward from the coast at Dover in a gently curving line having its convex side to the north. It

returns to the coast at Beachy Head as the South Downs. Through these hills the rivers have cut many gaps which are utilised by the railways to the south coast.

THE SURFACE FEATURES OF IRELAND.

The Mountains of Ireland lie in scattered groups round the chief feature of the country, the *Central Plain*. They are of little economic value, as they are deficient in mineral wealth and their soil is thin and poor. Most of the Central Plain is composed of limestone, overlain to a considerable extent by deposits of clay, which, being impervious to water, cause it to collect in the hollows, forming lakes and bogs. From the latter, peat is obtained, and is used largely as fuel, coal supplies being small. There are, however, large areas suitable for cultivation and for pastoral industries, and horses and cattle are raised in large numbers.

The position of the mountains causes the rivers to flow across the plain, which has, in consequence, marked facilities as regards inland water transport—an advantage which would be of much greater value if the country were more industrialised.

The indented nature of the coastline, due to the proximity of the mountains to the sea, results in the presence of many excellent harbours.

INLAND TRANSPORT

Inland transport is conducted by road, rail, river, and canal, and in the lowlands, where construction is easy, there is a network of railways and canals which is closest in the industrial areas round the great towns.

Railways.

The foremost railway centre of Great Britain is London, and from here great trunk lines radiate to all parts of the country. Each of the great industrial towns and the principal ports, however, has its own system of lines serving the surrounding district and connecting with the main lines, and the whole railway system of Great Britain is of enormous extent.

GREAT BRITAIN is served by four great railway companies: the London, Midland and Scottish (L.M.S.), with 7,790 miles of line; the London and North-Eastern Railway (L.N.E.R.), with 6,590 miles of line; the Great Western Railway (G.W.R.), with 3,800 miles; and the Southern Railway (S.R.), with 2,200 miles. These great systems have gradually been evolved by processes of amalgamation and absorption.

The London, Midland and Scottish Railway System, serving central England and the Scottish Highlands, is composed of many systems previously worked by separate companies, the chief of

which were the Midland, the London and North-Western, the Lancashire and Yorkshire, the Caledonian, the Glasgow and South-Western, and the Highland systems.

There are two principal lines in England, the old Midland line and the old London and North-Western line, both of which connect London with Carlisle. The old Midland line runs from its London terminus, St. Pancras, and serves the eastern portion of the Midland Plain. It crosses the Chiltern Hills by the Luton gap and proceeds across the plain *via* Bedford, Leicester, Trent Junction, and Chesterfield to Sheffield. From here the route lies along the eastern foothills of the Pennines to Leeds, at the eastern end of the Aire Gap. Crossing to the western side of the Pennines, the line uses the upper valley of the Ribble, and then the valley of the Eden, down which it passes to Carlisle.

The old London and North-Western line serves the western portion of the Midland Plain, and is often spoken of as the West Coast Route to the North. From its London terminus, Euston, the line runs across the Midland Plain, *via* Rugby and Stafford, to Crewe. From Crewe it proceeds north to Warrington, crosses the Mersey, and traverses the Lancashire Plain, *via* Wigan and Preston, to Lancaster, where it enters the valley of the Lune. It proceeds up the valley, over Shap Fell and down Edendale, to Carlisle.

It will be seen that these two lines serve exceedingly important and distinct industrial regions; the easterly serving the leather, hosiery, and lace industries of the east Midlands, the steel industry of Sheffield, and the woollen industry of the West Riding, and the westerly serving the varied industries of the Black Country (iron and steel goods, leather, pottery, etc.), and the cotton industry of Lancashire.

Proceeding north from Carlisle, the route again divides, one line passing up the valley of the Annan and the other up the valley of the Nith to cross the Southern Uplands of Scotland. The former line passes, *via* Lockerbie, up Annandale—as the valley of the Annan is called—whence it passes into the upper reaches of Clydesdale, which it follows to Carstairs. Here the line divides, one branch following the Clyde to Glasgow and the other proceeding north of the Pentland Hills to Edinburgh.

The line following the Nith valley enters Nithsdale at Dumfries—from whence a branch passes westwards along the coast to Stranraer. From Nithsdale the railway enters the Ayrshire Plain, across which it runs to Kilmarnock and Glasgow.

Lines run north from Glasgow, Carstairs, and Edinburgh across the Lowlands to Stirling, standing in the gap between the Lennox Hills and the Ochil Hills, whence one line passes into Strathmore and proceeds *via* Dunblane up the valley to Perth, standing at the head of the Tay estuary between the Sidlaw Hills and the Grampian Highlands. From Perth there are two important lines. One passes across the Grampian Highlands by

the Tay and Spey valleys to Inverness, the centre of all Highland routes, where it reaches the eastern coastal plain, and this it follows to Wick and Thurso in the extreme north. The second continues through Strathmore between the Sidlaw Hills and the Grampian Highlands, following the coastal plain to Aberdeen and thence to Inverness.

It will be seen that the Scottish portion of this great system serves the most important part of the Lowlands—the Clyde basin—as well as the most important part of the Highlands.

The London and North-Eastern Railway System, serving the east Midlands and the east coast of Britain, also includes many systems which, until recent years, worked independently. The chief of these were the Great Eastern, the Great Central, the Great Northern, the North-Eastern, the Hull and Barnsley, the North British, the Great North of Scotland, and the West Highlands systems.

This system has two main lines serving East Anglia, both starting from London (Liverpool Street). One passes east along the coast *via* Colchester, Manningtree (from whence there is an important branch to Harwich), Ipswich (branch to Norwich), and Beccles (branch to Lowestoft), to Yarmouth. The other proceeds up the valleys of the Lea and the Stort to Cambridge, whence it passes down the valley of the Great Ouse to Ely (branches to King's Lynn and Norwich), and over the plain to Spalding, Lincoln, and Doncaster.

The most important route of the system, however, is the East Coast Route to Scotland. Leaving the London terminus, King's Cross, this route takes advantage of the low eastern portion of the Chilterns at Hitchin and traverses the plain *via* Peterboro', Grantham, and Retford to Doncaster. Beyond Doncaster, it enters the Vale of York, which lies between the Yorkshire Wolds and the North York Moors and the Pennines, and, sending branches to the woollen towns of the West Riding, passes through York to Darlington. Here it reaches the coastal plain, which it crosses *via* Durham to Newcastle. The main East Coast Route continues along the coast from Newcastle to Berwick, beyond which it passes across the Border and follows the narrow coastal plain through Dunbar to Edinburgh. From Newcastle there is an important branch line crossing the Pennines by the Tyne Gap to Carlisle. From Carlisle the line continues across the Southern Uplands *via* Liddesdale and Tweeddale, the Waverley Route, and passes through Hawick and Galashiels up the Gala valley to Edinburgh.

Continuing north from Edinburgh, the railway crosses the Forth Bridge, passes through Fife to the Tay Bridge, by means of which it reaches Dundee and Montrose. Between here and Aberdeen—where the old Great North of Scotland Railway connects with the Moray Firth by utilising the valley of the Don—there is a break in the L.N.E.R. system, but the company

have acquired running powers over the L.M.S.R. in order to complete the route.

The L.N.E.R. also serves the Glasgow region and the West Highlands by a line running from Edinburgh. The route from Glasgow is *via* Loch Long, Loch Lomond, and the Moor of Rannoch to Fort William and Mallaig, whence Stornoway may be reached by steamer.

Apart from this important route to the north, the L.N.E.R., by the old Great Central line from the Marylebone terminus in London, serves the Midland Plain, south Yorkshire, and Lancashire. The route crosses the Chilterns at Aylesbury and proceeds *via* Rugby, Leicester, and Nottingham to Sheffield. Here it divides, one line going to the east coast *via* Lincoln, and the other crossing the Pennines to Manchester and the Mersey.

It will be seen that this system competes with the L.M.S.R. in the east Midlands and the Sheffield district. In addition, it serves the great fishing ports of the east coast and the important industrial region round Newcastle-on-Tyne. In Scotland, though specially important to the eastern Lowlands, it has not the importance of the L.M.S.R. system.

The Great Western Railway System is composed of the old Great Western Railway and several other companies, most of which used to operate independently in Wales. It has several important main lines, and also covers a wide area by lines of secondary importance.

The main western line leaves the London terminus, Paddington, and passes up the Thames valley to Reading. Here it leaves the Thames and follows its right-bank tributary, the Kennet, till it reaches the Vale of Pewsey, lying between the Marlborough Downs and the North Wiltshire Downs, bordering Salisbury Plain on the north. Passing down the vale and leaving the Mendip Hills on the north-west, it proceeds to Taunton and enters the vale of that name, which it follows between the Quantock Hills and Exmoor, on the north and north-west, and the Blackdown Hills, on the south, into the Plain of Devon and so to Exeter. Leaving Exeter, it skirts the south of Dartmoor, following the coastal plain to Plymouth, and passes south of Bodmin Moor to Penzance.

Another line follows the same route as far as Reading, but continues up the Thames valley, through what is known as the Thames gap, between the Chilterns and the Marlborough Downs to Swindon, and then runs to the Severn estuary, passing south of the Cotswolds and north of the Mendips, *via* Bath and Bristol. By means of the Severn Tunnel it reaches Newport (Mon.), and follows the South Wales coastal plain *via* Cardiff, Swansea, and Llanelly (from which towns and Newport many lines serve the coalfield) to Pembroke and Fishguard (for Ireland). This route is connected with the previous one by a line from Bristol to Taunton.

A third line runs north-westwards from London, crossing the Chilterns at High Wycombe and passing between Edge Hill and the Northampton Uplands at Banbury, to Warwick and Birmingham. From Birmingham it proceeds through the Black Country to Shrewsbury (whence Wales and the Severn valley are served by several lines) and Chester.

It will be seen that the Great Western Railway system serves the great industrial region of the South Wales coalfield as well as the important industrial towns of the Black Country.

The Southern Railway System, like the other great systems, includes many companies which up to the war operated independently. The chief of these were the London and South-Western, the London, Brighton and South Coast, and the South-Eastern and Chatham. The system links its London termini, Waterloo, Victoria, and London Bridge, with the cross-Channel ports (Dover, Folkestone, and Newhaven), the great passenger port of Southampton, the naval stations of Chatham and Portsmouth, and many popular coastal holiday towns.

The longest main line of the system is that of the old London and South-Western from London to Exeter. This leaves the London terminus, Waterloo, and crosses the chalk uplands of north Hampshire and Wiltshire with little deviation, passing through Basingstoke and Salisbury. From Exeter, lines serve North Devon, Plymouth, and mid-Cornwall.

It will be seen that this system contrasts sharply with the other great systems in that it serves no great industrial region, but does an enormous amount of holiday and continental traffic. The development of the coal and iron resources of eastern Kent, however, may make considerable difference in this respect.

IRELAND.—In Ireland, since the interior is so flat and the coastal mountains offer many easy passages through them, the railway routes are not determined by the relief of the land so largely as they are in Great Britain. Nevertheless, the effect of the physical features can be clearly seen.

In the *Irish Free State*, the railways radiate from Dublin. The Great Northern Railway runs along the coast through Drogheda to Dundalk. It then passes inland, to avoid the Mourne Mountains, to Portadown, from whence one branch passes down the Lagan valley to Belfast and the other to Londonderry, which it reaches *via* the valley of the rivers Mourne and Foyle. This line thus units the Irish Free State with Northern Ireland.

The Midland Great Western Railway crosses the Central Plain, proceeding from Dublin *via* Athlone to Galway, and Clifden.

The Great Southern and Western Railway passes inland from Dublin, following the valley of the Liffey and utilising the plain lying to the south-east of the Slieve Bloom Mountains to reach Charleville, from whence a branch passes north to Limerick,

the main line continuing south to Cork. From Mallow, between Charleville and Cork, an important branch leaves the main line and runs east to Waterford, which town is served also by a less important branch from Maryborough down the Nore valley.

The Dublin and South-Eastern Railway connects Dublin, *via* the south-east coast, with Wexford.

In *Northern Ireland*, in addition to the Great Northern Railway, there is the Belfast and Northern Counties Railway, which connects Belfast and Londonderry and passes through Antrim. An important line of this railway runs from Belfast to Larne.

Inland Waterways.

Before the dawn of the railway era there was a boom in *Canal* construction, and many canals were cut throughout the lowlands of Great Britain. With the growth of railway transport, however, they were subjected to severe competition to which many succumbed completely. To-day, the *barge* canals of the country suffer from neglect; they are generally both too narrow and too shallow to take large barges, and the loading and unloading facilities are inadequate. Further, there have been few attempts made to improve the existing canals or to construct new ones. The British barge canals are, therefore, of comparatively small importance, though their possible future development has been considered in view of the great commercial importance of canals in France and the Netherlands. Where, however, they pass through the great industrial regions they provide cheap transportation for bulky goods for which speed is not essential.

The chief inland waterways of England may be summarised as follows :—

The industrial districts of east Lancashire and the West Riding of Yorkshire are served by several canals and canalised rivers. Among these the *Leeds and Liverpool Canal*, which connects Liverpool with Leeds, *via* Blackburn and Burnley, forms, with the *Aire and Calder Navigation*, from Leeds to Goole, a waterway between the Mersey and the Humber. The river Trent also carries some traffic and is connected with the Mersey by the *Trent and Mersey Canal*, which runs through the Potteries from near Burton-on-Trent. The *Shropshire Union Canal* system is of some importance, though by no means of such importance as the canals already mentioned, and the river Weaver is useful for transport between the salt-works of Cheshire and the Mersey. The *Birmingham Canal Navigations* have connections with the four great estuaries of England and are of considerable importance to the Midlands. This system of canals is joined to the lower Thames and London by the *Grand Junction Canal* and to the upper Thames at Oxford by the *Oxford Canal*.

The foregoing are the only portions of the English barge canal

system which are of any considerable commercial importance at the present day. In many parts of the country, however, there are canals and river navigations which are either actually derelict or only just maintained in working order.

In Ireland, as has already been pointed out, the features of much of the country and the position of the mountains has rendered canal construction comparatively easy. Here there is but a very meagre canal traffic, and the only canals which need be mentioned are the *Royal Canal* and the *Grand Canal*, which connect the river Shannon with Dublin.

The chief *ship* canals of Great Britain are as follows :—

The *Manchester Ship Canal*—easily the most important—gives access to ocean-going liners from the Mersey to Manchester, which city it has made an inland port of first importance. It is 35 miles long and 28 feet in depth, and is available for ships of up to 11,000 tons.

The *Berkeley Canal*, from Gloucester to the Severn estuary, is 16 miles long and 15 feet in depth. It is navigable by steamers of 1,500 tons and relieves the congestion for food distribution at Bristol.

The *Forth and Clyde Canal*, connecting Bowling and Glasgow, on the Clyde, with Grangemouth on the Firth of Forth, is as yet available only for large trawlers or small coasters.

The *Caledonian Canal* enables small ships to avoid the stormy Pentland Firth.

The *Crinan Canal* makes it unnecessary for small vessels proceeding between Glasgow and the north-west of Scotland to make the long voyage round the Mull of Kintyre.

The ship canals of the country are in quite a different category from the barge canals, and those serving industrial regions are of great commercial importance. The two last named, however, do not fulfil this requirement, and are of comparatively little commercial value.

In addition to the ship canals mentioned above, some of which are merely natural waterways canalised (or artificially deepened), all the important rivers of the country are constantly dredged in their lower reaches to enable ships to penetrate to the towns lying on their banks. Thus the Thames, the Bristol Avon, the Tyne, and the Clyde might well be regarded as great ship canals.

Roads.

In the days of the Romans roads were of first importance, but in the Middle Ages the magnificent highways constructed by those greatest of road-makers were allowed to fall into decay, and up to Elizabethan times the only "safe" means of travel was on horseback or on foot. With the coming of the stage-coach the importance of roads began to increase, but the improvement was very slow, and it was not until scientific road-making

was introduced by Telford and McAdam in the nineteenth century that they began to approach in any degree what we consider a fair road to-day. And just as they were beginning to develop on adequate lines, the railway era began and the coaches were gradually forced off the roads by the irresistible competition of the railways. It has remained for the invention and development of the internal combustion petrol-engine to give to the roads a new and vastly increased importance. To-day, with the enormous increase in the volume of motor transport, great road improvements have been, and are being, made, and great arterial roads are appearing throughout the country.

AGRICULTURAL AND PASTORAL INDUSTRIES

The amount of land available for agriculture in the British Isles is comparatively small, and the population to be supported is very large in comparison. Thus, although the yield per acre is exceeded only in Belgium, Holland, and Denmark, and large quantities of all kinds of farm produce are grown, the home supply is by no means equal to the demand, and it has to be supplemented to a great, and ever-increasing, extent by imports. The British farmer is obliged to adopt intensive methods of farming, but such methods are not well developed in this country, as they are in France, and he cannot compete with the settler in "new" and thinly populated lands in the production of cheap and plentiful supplies of food stuffs. Unlike the cultivator of virgin land he has to spend much time and money in thoroughly fertilising and tilling the soil if good crops are to be produced, and he has, in addition, a comparatively high rent to pay for his land. These disadvantages greatly outweigh the advantage of having the markets for his produce close at hand, and often make it more profitable for him to convert his fields into pastures than to struggle against such overwhelming competition in the production of grain.

Apart from the area covered by buildings, roads, railways, etc., the land of the British Isles may, broadly, be divided into woods and orchards, grazing land (including moorland), and arable land.

The climatic conditions of the British Isles are favourable to forest growth, and there is no doubt that the islands were at one time densely wooded. The forests were mostly destroyed centuries ago, when wood was used so largely for fuel, as a source of charcoal for iron-smelting and for building purposes, and when trees were cut down to make room for pasture and agriculture. Only about 5 per cent. of Great Britain and 2 per cent. of Ireland is now covered with trees. There are many parts of the country, however, where woods might with advantage be planted, and the afforestation of such areas—where the elevation of the land

or the poor quality of the soil are unfavourable to agriculture—would add greatly to our national resources. At present *forestry* is of little importance in the British Isles, and almost all our supplies of timber have to be obtained from abroad.

Fruit Growing.

Of the fruits grown in the country only the hardier varieties, such as apples, plums, and cherries, are produced in any considerable quantities. The chief fruit-growing regions are the Lower Severn Valley, and the south-eastern counties, in England, and the Carse of Gowrie, in Scotland. In all these districts jam manufacture is carried on, notably at Dundee, Cambridge, and London. In the Severn Valley Herefordshire cider and Worcester perry are made, and cider is also a famous product of Devonshire.

Pastoral Industries.

Of far greater extent than the woodland and orchards of the British Isles is the area covered by moorland and permanent pasture. Of this England has the greatest area of good grazing land, for only 7 per cent. is moorland and mountain as against 41 per cent permanent pasture. In Scotland, on the other hand, 49 per cent. of the area is of the poorer quality grazing land, only 7 per cent being permanent pasture.

CATTLE are reared mainly in the western lowlands of both Great Britain and Ireland, and here the climatic influence is clearly seen. They require rich pasture and mild winters—to reduce the necessity for housing to a minimum—and the abundant rainfall and equable climate of the west are therefore specially favourable.

In England and Wales cattle are reared chiefly in Cheshire, Lancashire, Pembrokeshire, Cornwall, Devonshire, Somersetshire, Herefordshire, Staffordshire, and Leicestershire. In Ireland cattle are generally numerous, but the counties of Limerick, Meath and Dublin, in the Irish Free State, are the most important regions. Here the number of cattle to the hundred acres is over thirty as against twenty in the English counties mentioned. In Scotland no county has many cattle—the proportion for the whole country is only six per hundred acres. Renfrew, Wigtown, Aberdeen, and Fife are the chief counties.

Dairy cattle are reared on lowlands where there is specially rich pasture, as in the Irish Free State, an important dairying country with dairy produce as her chief export. Devonshire and Cornwall are justly famous for their cream, and many other parts of Great Britain produce excellent butter and cheese, *e.g.*, Somerset (Cheddar) and Cheshire. The home supply of dairy produce, however, and indeed of beef, is quite inadequate for our needs, and large quantities have to be imported. The Irish

Free State thus has a valuable market for all her dairy produce in Great Britain.

SHEEP, which thrive on higher ground and poorer pastures than cattle, are found in the largest numbers on the Southern Uplands of Scotland, the Welsh Uplands, the Pennines, the wolds of Lincolnshire and Yorkshire, the Cotswolds, and the hills of south-eastern England. They are reared either for wool or mutton, or both. The sheep found in the west are reared chiefly for mutton, while those feeding on the hills of the east are reared both for wool and mutton.

The Southern Uplands of Scotland are noted for their sheep, the Cheviot breed—which supplies the woollen industry of the Tweed Valley—being particularly famous, yielding both wool and mutton of fine quality. The Cotswolds, Leicesters, and Lincolns are all valuable for their wool, while the Welsh, Shropshire, and South Down sheep are short-woolled and famous for their mutton.

PIGS are bred in the largest numbers in Ireland, particularly in the south-east, and large quantities of bacon and ham are exported to England. Many pigs are reared in England, however, the bacon of Wiltshire and the hams of Yorkshire and Westmorland being famous.

HORSES are now reared in the British Isles chiefly for farm work and military and sporting purposes. They are bred in many parts, but chiefly in the lower and drier regions: in England, the chief regions are the Yorkshire Ridings, Norfolk, Cambridge, and Huntingdon; in Ireland, Dublin, Down, Wexford, and Louth; and in Scotland, Fife and Linlithgow.

The two chief types of horse are reared in different regions. The heavy work horse comes principally from Clydesdale, the Fenlands (the famous Shire horse), and Suffolk. The light horse (*e.g.*, the thoroughbred, the hackney, and the pony) comes from various regions. The North and East Ridings of Yorkshire are noted for carriage horses; hunters are bred in many counties of England and Ireland, but Munster and Leinster, in the Irish Free State, are specially important; hackneys are reared chiefly in the eastern counties of England; and the rugged moorland parts of Great Britain—such as the Shetland Islands, the Scottish Highlands, the Welsh Uplands, Dartmoor, and Exmoor—produce small ponies.

Agricultural Industries.

Of the total land surface of the British Isles only about a quarter is under cultivation, England being well to the fore in this respect. Of the total arable land more than half is devoted to the production of greencrops (roots, hay, etc.) and the remainder

to cereals. It is in the production of cereals that the effect of the physical conditions is most clearly seen.

WHEAT is grown to any extent only in England, where it thrives best in the eastern counties from the Humber to the Thames, known as *East Anglia*. Here, not only is the climate most suitable—the rainfall being lower and the proportion of summer heat and sunshine higher than elsewhere—but the clayey soil and the levelness of the land are particularly favourable.

BARLEY, like wheat, is grown most extensively in eastern England, but as it is able to thrive in less favourable climatic conditions and is not so dependent on the character of the soil, its range is much wider, and it is grown to some extent in Scotland and Ireland, where it is used largely in the whisky distilleries.

OATS are still less exacting in their climatic requirements, and are grown widely throughout the British Isles, especially where the cultivation of wheat is impossible.

RYE, the only other cereal grown in these islands, is produced only to a small extent. It is grown as fodder in parts where the other cereals cannot be cultivated.

ROOT CROPS grown in the islands are mainly *potatoes*, *turnips*, *swedes*, and *mangolds*. Of these, potatoes, which are cultivated chiefly for human consumption, are produced most extensively in Ireland. The others are widely grown as food for animals. The cultivation of *sugar beet* is making considerable headway in the eastern counties of England, under the stimulus of the subsidy paid by the Government, but the acreage is still comparatively small.

HOPS, for the manufacture of beer, are an important product of Kent, and are grown in considerable quantities also in Worcestershire and the neighbouring counties.

FLAX is grown for the manufacture of linen in Northern Ireland, but the quantity produced is by no means sufficient for the requirements of the industry and a great deal has to be imported.

MINERALS AND MANUFACTURES

Minerals.

By far the most important mineral found in the British Isles—both in its utility and the quantity produced—is *coal*: this, together with *iron*, the next most important of our minerals, forms the basis of our industrial prosperity. It has already been pointed out that coal exercises a powerful attraction for industries, and that the great industrial regions of the world to-day

are found on the developed coalfields. In this respect the British Isles are no exception, for all our great manufacturing industries are found on or near the coalfields.

COAL.—The great importance of coal-mining as a distinct industry is apt to be overlooked in considering the great manufacturing industries which it supports, and it is well to bear in mind that the coal industry is itself of immense national importance.

“With the exception of agriculture, to which it is a close second, the industry employs more men than any other; not less than one-twelfth of our population is directly dependent on it. It is the foundation of our iron and steel, shipbuilding and engineering trades, and, indeed, of our whole industrial life. The value of its product is in the neighbourhood of £250,000,000 a year. It provides one-tenth of our exports in value and about four-fifths of them in volume. By furnishing outward cargo for a large amount of shipping, it cheapens freights for the imports on which we depend for our vital needs.”¹

The coalfields of Great Britain are, in the order of output, as follows :—

1. York, Derby, and Notts.
2. South Wales.
3. Northumberland and Durham.
4. Forth and Clyde fields.
5. Lancashire and Cheshire.
6. Midland fields.
7. North Wales.
8. Cumberland.
9. Forest of Dean.
10. Bristol.
11. Kent.

In Ireland there are a few small coalfields of little economic consequence, but the most important of them—that of Kilkenny in the Irish Free State—yields but small quantities of coal, and that of an inferior quality. The absence of coal has been the greatest economic drawback of Ireland, and the discovery of coal in east Tyrone (Northern Ireland) a few years ago and the opening of the Coalisland Colliery in July 1924, have raised great hopes of future prosperity. The industries of Northern Ireland have been dependent hitherto on imported coal supplies, Belfast itself spending on that account over £2,000,000 a year. The opening up of this coalfield may therefore prove of considerable importance in the economic development of this region, as a cheap and plentiful supply of coal raised locally would retain this capital at home and enable manufacturers to compete more effectively with English and foreign rivals. Ulster is rich in iron ore, and only the formidable cost of imported coal has prevented iron and steel industries from taking root round Belfast.

¹ *The Report of the Royal Commission on the Coal Industry (1925).*

Great Britain enjoys special advantages in the production of coal. In comparison with the size of the island the area of the coalfields is very great. Moreover, the quality of the coal is very fine. Bituminous, or house coal, is the most abundant of the varieties mined, but steam coal and anthracite of specially fine quality are found in considerable quantities in South Wales. Steam coal is so called because of its property of raising steam rapidly while giving off little smoke, a property which has hitherto made it of special value for naval use. Another great advantage is the ease with which the coal can be handled, it being produced at or near navigable water on nearly all the coalfields. The Durham and Northumberland field is intersected by the Tyne estuary; the Cumberland field extends to the coast and, indeed, under the sea; the Lancashire and Yorkshire fields have easy access to the coast, being situated in the narrowest part of the country; the South Wales field extends along the coast from Pembroke to Monmouth; the North Wales field lies near the sea at Chester; the Bristol and Forest of Dean fields lie near the Severn estuary; the Kent field extends to the coast near Deal; and the Midland fields, where the coal is mined comparatively far from the sea, have, owing to the level nature of the country, the benefit of cheap transport by canal and river. In Scotland, also, the coalfields actually extend to the sea or have easy means of communication with the coast.

The coalfields support and are responsible for many local industries, but there is also a very large export trade from Britain. South Wales exports coal to the countries of the Mediterranean, Northumberland and Durham supply London and the Baltic and North Sea countries, while Ireland obtains her coal supplies from Ayrshire. In addition, most coaling stations receive coal from Great Britain.

As coal is of such great importance to the United Kingdom the question of the duration of our supplies is a vital one. The conclusions drawn by the Royal Commission of 1925 with regard to our resources are, therefore, of special interest.

"1. Assuming that the present rate of output remains fairly constant, and that the working of levels deeper than 4,000 feet does not become possible, the coal at present known to exist in the United Kingdom will last for between four and five centuries.

"2. If account is also taken of probable and possible reserves, there should be enough coal to last for about seven centuries.

"3. If it should prove possible to work coal from levels below 4,000 feet, or if new coalfields were discovered in areas previously untried, as was recently the case in Kent, there would be a corresponding extension in the duration of our resources.

"4. There would be a further extension if fresh means were found of utilising the small coal which is now so extensively wasted. But there is also the possibility that science may discover new sources of energy, replacing, in greater or less degree, the use of coal."

With regard to the scientific utilisation of coal it is interesting to note that the policy is being developed of using coal and waste gases for the generation of electrical power at the pit head, the power being distributed by electric cables, *e.g.*, on the north-east coast, in Central Scotland, and south Lancashire.

IRON.—Fortunately, iron ore is found in the British Isles near the supplies of coal. Indeed, in several of the coalfields—notably Lanarkshire, Cumberland, and North Staffordshire—it is mined along with the coal. The most important producing districts, however, are the *Cleveland Hills* of Yorkshire, which form the north-eastern extremity of the Jurassic ridge, from which about 90 per cent. of the ore mined in Britain is obtained, and the *Furness* peninsula of North Lancashire. In the Cleveland district the ore is found associated with limestone, which is a valuable flux in the smelting process. The ores of the Furness district are the finest in quality of the British ores. Smaller quantities are mined in the Lincolnshire, Leicestershire, and Northamptonshire regions of the Jurassic ridge.

The production of iron of good quality is not sufficient for the needs of the country, however, and considerable quantities have to be imported.

TIN is mined in Cornwall in considerable quantities, though the production when compared with that of the great producing countries is almost insignificant.

COPPER also is mined in Cornwall, though in very much smaller quantities even than tin.

LEAD is mined to a small extent in North Wales (Flint) and the Southern Uplands of Scotland, but it is found also in the Isle of Man, to the west of Durham, and in the southern part of the Pennines.

ZINC is found in small quantities in North Wales and the Isle of Man, but the deposits are not sufficiently rich to warrant the expensive operations necessary in working them.

OIL SHALE is mined in the Lowlands of Scotland, chiefly in Linlithgowshire. The waxes obtained are manufactured into candles at Battersea.

SALT is mined in Cheshire, at Northwich, Middlewich, and Nantwich; in Worcestershire at Droitwich; in Durham near the Tees estuary; and in Lancashire near Fleetwood. It is usually pumped out of the mine in the form of brine, and the salt is then obtained by evaporation. From salt many useful chemicals are made.

BUILDING STONES are of local importance. Of these, *granite* comes chiefly from the east of the Scottish Highlands (Aberdeen

and Peterhead), Devon and Cornwall, Leicestershire (Charnwood Forest), Carnarvon, and the mountains of Wicklow, in the Irish Free State. *Limestone* is obtained at many places in the limestone ridge running from the mouth of the Exe to the mouth of the Tees. Portland, Bath, and Mansfield are important centres. *Marble* is quarried in England in Devonshire and Derbyshire, and, in the Irish Free State, in Galway and Kilkenny. *Slate* comes chiefly from the uplands of North Wales and Cumberland, and the Highlands of Scotland (Argyllshire).

CLAY is dug for brick-making in many parts of south-eastern England; clay fit for coarse pottery is obtained in many districts, but *china clay* or *kaolin*, is obtained only from Devonshire and Cornwall; *fireclay*, used for lining furnaces, is found in many parts, chiefly on or near the coalfields.

CHALK, from which *cement* is made, is abundantly available in south-eastern England.

Manufactures.

The chief manufacturing industries are dealt with below according to the coalfield on which they are situated. It must be pointed out, however, that in some cases industries are carried on away from the source of power. In such exceptional cases it will be found that special facilities exist which counteract this disadvantage. For example, shipbuilding is carried on at Barrow-in-Furness, where there are local supplies of iron ore but no coal; there is, however, an excellent, well-sheltered waterway between Walney Island and the mainland and this is of more importance even than local coal supplies. Again, many towns in the wheat-growing regions, *e.g.*, Lincoln, make agricultural machinery, such as ploughs and steam-threshers for local use. For such products the transport charges are relatively high, and it was found more economical to carry on the industry where there was a ready market for the finished goods. In towns such as Bedford, Lincoln, Gainsboro', Grantham, and Ipswich the industry has now developed to such an extent that an export trade has been built up. The miscellaneous manufactures of London are accounted for in a similar way, the enormous local demand outweighing the necessity for importing coal.

Industries of the English Coalfields.

THE YORK, DERBY, AND NOTTS COALFIELD extends from Leeds and Bradford, on the north, to Nottingham, in the south. The industries it supports are varied, but the most important are those connected with wool and iron.

The Woollen Industry of the West Riding of Yorkshire is very much more important than that of any other part of Britain.

The industry flourishes in other districts—notably in Wiltshire and the Tweed Valley—but on a scale which cannot in any way compare with that of the Yorkshire industry. In all cases, however, the advantages of local supplies of wool and of the presence of streams, which provided both power and water for cleaning and dyeing the wool, were the original cause of the establishment of the industries. Other and subsequent advantages have maintained the industry in this district. It was not until much later, when steam power took the place of water power, that the accessibility of supplies of coal became by far the most important determining factor. The local supplies of wool have long since ceased to meet the needs of the industries, and enormous quantities have to be imported every year.

The factors which make Yorkshire so eminently suitable for the woollen industry are (a) the large local supplies of both coal and iron and the local development of machinery manufacture; (b) the special transport facilities provided by the estuary of the Humber and the rivers and canals connecting with it for the import of the raw material and the export of the finished goods; and (c) the proximity of the North European market.

Leeds, situated where the Aire valley broadens out to the plain, is the commercial centre of the district and an important manufacturing town. Here coarse woollens, such as blankets, flannels and coarse cloths, are manufactured in large quantities, and there is, also, an important manufacture of ready-made clothing of all descriptions.

Bradford is the true centre of the woollen industry, however, and manufactures every kind of woollen fabric. It has great mohair factories and produces carpets and worsted yarns and goods whose fame has spread to all parts of the world. Other towns similarly engaged are *Halifax* (carpets), *Huddersfield* (broadcloth), *Wakefield*, and *Keighley*. *Batley* and *Dewsbury* work up old woollen cloth and wool "waste" into "shoddy" (the name given to remanufactured material). "Mungo," made from second-hand material and akin to shoddy, owes its name, says local tradition, to the remark applied by a Yorkshire manufacturer to a fabric he was thrusting upon the world, that "it mun go." It did!

The Iron Industry also is of great importance and promotes a large engineering industry. Machinery for the woollen and other industries is made in several towns, of which *Leeds*, *Halifax*, and *Keighley* (making spinning and weaving machines) are the chief. Rolling-stock and pit requisites generally are made at *Leeds*, *Rotherham*, and *Sheffield*. The last-named town is most important, however, for the manufacture of cutlery, the industry having originated because of the local supplies of coal and iron, and of grindstones from the "millstone grit" of the Pennines. The best cutlery is now made from Swedish iron. In addition

to cutlery and pit machinery, *Sheffield* manufactures high class steel for the building of war vessels and is important for the production of electro-plated goods.

At *Doncaster*, the new centre of the Yorkshire coalfield, and *Derby* are important railway works, and the latter town also manufactures motor-cars and aeroplane engines.

Other Industries.—*Bradford*, besides its woollen manufactures, makes silks, plushes, and velvets; *Leeds* manufactures boots, shoes, and chemicals; *Barnsley*, linen; *Nottingham*, lace and hosiery (cotton); *Derby*, silks and china, and *Castleford* has extensive glass-works.

Ports.—Owing to the narrowness of this part of the country and the excellence of the transport facilities, the region is served by ports on both the west and east coasts: *Liverpool* on the Mersey and *Hull* and *Grimsby* on the Humber. *London*, however, receives most of its supplies of wool and forwards them by rail.

THE NORTHUMBERLAND AND DURHAM COALFIELD also is an important iron manufacturing region, the iron being brought cheaply by sea from the Cleveland district of Yorkshire. There is, however, an extremely important iron industry in the Cleveland district itself, round Middlesbrough, supported by coal brought from the coalfield. This industry, though strictly not one of those on the coalfield, is nevertheless an industry directly connected with it and may, therefore, be included here.

This field extends from the river Coquet, in the north, to within a short distance of the river Tees, in the south. From the Coquet to just south of the Tyne estuary it borders the coast, and thus there are important seaports lying actually on the coalfield and able to supply coal cheaply for export (which is consequently considerable) and bunkering and to import raw materials and manufacture them on the spot.

Important navigable rivers flow through the field: the Tyne, navigable for ocean-going vessels as far as *Newcastle*, and the Tees, as far as *Stockton*. The Wear, though useless for navigation, has a deep mouth providing facilities for shipbuilding at *Sunderland*.

Shipbuilding is of special importance on this coalfield, for iron and coal are found in close proximity near navigable water—an essential condition of the industry. The Tyne is lined on both banks with shipbuilding yards from its mouth at Shields (North and South) to Elswick, the whole district being appropriately known as Tyneside. Other important shipbuilding towns are *Sunderland*, *Hartlepool*, *Middlesbrough*, and *Stockton*.

The Iron Industry is important for supplying the shipbuilding yards—particularly from the works of *Middlesbrough* and *Consett*—and for the manufacture of iron and steel goods. Of these the locomotives built at *Darlington* are of special importance.

Another considerable industry of this coalfield is the manu-

facture of *chemicals*. This is due to the plentiful supplies of salt available at Greatham at the mouth of the Tees. From Newcastle to Jarrow the south bank of the Tyne is lined with chemical works manufacturing such products as washing soda, bleaching powder, hydrochloric acid, and sulphuric acid, and there are similar works bordering the estuary of the Tees. *Newcastle*, in addition to being the centre of the shipbuilding and chemical industries, manufactures guns and machinery.

THE LANCASHIRE AND CHESHIRE COALFIELD, lying on the slopes of the western Pennines, supports the most important manufacturing industry of the country—that of cotton—and the district is the most thickly populated of the British Isles. It is interesting to contrast the length of life of this industry with that of the woollen industry, which is the oldest industry in the country and was at one time the most important, hence the significance of the Woolsack. The cotton industry is younger, dating its introduction to this country to the Stuart period, but its premier position is already threatened, for it is likely to be seriously affected by the artificial silk industry, the product of which has attained an amazing popularity of recent years, and works for which are being established in many parts of the country.

The Cotton Industry is favoured here by (a) the abundant local supplies of coal and iron; (b) the damp climate, without which the thread would become brittle and liable to snap; (c) the facilities for importing American cotton—which forms the bulk of our supply—through Liverpool and Manchester; and (d) the local supplies of salt from which chemicals for bleaching and dyeing are manufactured.

In all the cotton towns spinning, weaving, dyeing, and printing are carried on to some extent, but certain groups specialise in one process. Thus, the great spinning towns are *Bolton*, *Bury*, *Rochdale*, *Oldham*, *Ashton*, and *Manchester*, the last named being also the great market for the whole industry. These towns all lie in south Lancashire. The great weaving towns, on the other hand, lie farther north. They are *Preston*, *Blackburn*, *Accrington*, *Burnley*, *Nelson*, and *Clitheroe*.

It should be noted that the cotton manufactures of Nottingham show the influence of the climate in the coarser type of fabrics made; the weaving of fine threads being impossible in the drier air.

Other Industries.—In most of the cotton towns there are large engineering and electrical works making machinery for the mills, e.g., *Manchester*, *Salford*, *Oldham*, *Rochdale*, and *Bolton*; chemicals are made in several towns, but principally at *Widnes* and *St Helens*, where glass also is made; soap, at *Liverpool* and *Warrington*; woollen goods, at *Rochdale* and *Bury*; and silk, at *Macclesfield*, in Cheshire.

Ports.—Liverpool and Manchester, whose importance is largely due to the construction of the Manchester Ship Canal, are the main ports for this busy district.

THE MIDLAND COALFIELDS are four in number: the North Staffordshire field, the South Staffordshire field, the Warwickshire field, and the Leicestershire field.

The North Staffordshire field is a continuation of the Lancashire and Cheshire field. It extends from the north of the county almost as far south as Stafford.

The Pottery Industry is the great industry of this coalfield. At one time it obtained all its supplies of clay locally, but now only the coarser kinds of pottery are made from Staffordshire clay, and clay for the finer pottery and china is obtained chiefly from Devon and Cornwall. The Five Towns—as the five largest towns of the potteries are often called—are *Stoke, Hanley, Newcastle-under-Lyme, Burslem, and Longton*. The clay from Devon and Cornwall comes to the Mersey by sea and then by the Weaver, Trent, and Mersey canal to Stoke.

Near this coalfield is the great railway junction of Crewe, which has great works where locomotives and rolling-stock are made.

The South Staffordshire field, extending from near Stafford some twenty miles to the south, possesses rich deposits of iron ore and supports the varied *hardware industries* of the Black Country. The great manufacturing towns of this region, lying comparatively far from the coast, have specialised (a) in articles which are of high value in proportion to their bulk (e.g., rifles, locks, chains, anchors, cycles, and needles), which can consequently bear the comparatively high transport charges, and (b) locomotives and motor-cars, which can, as it were, take themselves to market.

As in the case of the cotton industry of Lancashire, though all the towns manufacture all types of hardware, many of them have specialised in some particular article. Thus, *Birmingham*, the chief town of the region, though lying just off the coalfield, is famous for small arms, cycles, and engines; *Dudley* is noted for screws; *Wednesbury*, for nails; *Wolverhampton*, for cycles and locks; *Reddich*, for needles and fish hooks; and *Cradley Heath*, for chains and anchors.

Other manufactures of the region are *saddlery* at *Walsall*, *carpets* at *Kidderminster*, *glass* at *Stourbridge*, and *artificial silk* at *Wolverhampton*.

The Warwickshire field is of much smaller area and less importance than the South Staffordshire field and lies to the east between the rivers Tame and Anker. There are no important towns on the field itself, but *Coventry*, lying to the south, is noted for the manufacture of *motor-cars, cycles, and artificial silk*.

The Leicestershire field, lying to the north-east of the

Warwickshire field, is, like that field, lacking in iron ore and has no hardware industries. No important towns lie on the coalfield, but near-by are *Burton-on-Trent*, famous for its *brewing* industry, and *Leicester*, noted for the manufacture of *woollen hosiery and boots and shoes*.

THE CUMBERLAND COALFIELD is a small field lying between the Cumbrian Hills and the sea. Most of the coal is exported from *Whitehaven* and *Maryport*, but there is a small iron industry at *Workington*. This field supplies the coal for the important iron and steel industry of the Furness district of Lancashire, which lies 30 or 40 miles away to the south-east. Here the local supplies of rich iron ore (*hæmatite*) and the special advantages of the situation of *Barrow* have given rise to specialisation in shipbuilding. Local supplies of *plumbago* give rise to a pencil industry in *Keswick*, but the industry now depends on the import of *graphite* from *Ceylon*.

THE BRISTOL COALFIELD lies on either side of the Bristol Avon, between the Cotswold Hills and Bristol, the chief town of the coalfield. It supports the varied industries of *Bristol*, of which the chief are the manufacture of *tobacco and cigarettes*, of *cocoa and chocolates*, and the refining of *sugar*. The towns of *Bradford* (not to be confused with the Yorkshire town of that name), *Trowbridge*, *Stroud*, and *Devizes*, lying off the coalfield to the east, are important for the manufacture of *broadcloth*, from which naval and military uniforms are largely made. These are the west of England woollen towns.

OTHER ENGLISH COALFIELDS.—These include the following :—

The Forest of Dean field, lying between the Severn and its tributary the Wye, is really an outlier of the South Wales field. It has no important industries.

The Mid-Severn fields, lying at intervals along the course of the Severn, and now of little importance.

The Kent field, a new coalfield of growing importance in eastern Kent. As there are large supplies of iron ore of fair quality in the neighbourhood, it is expected that the development of this field will result in the industrialisation of the region.

Industries of the Welsh Coalfields.

THE SOUTH WALES COALFIELD extends across the whole of north Glamorganshire into Monmouthshire on the east and Carmarthenshire on the west, and has an extension in the Pembrokeshire field. The main field actually reaches the coast only along the Swansea and Carmarthen Bays, but nowhere is it far from the sea, and the valleys of the numerous streams flowing south to the Bristol Channel provide ready means of access to the heart of the coalfield from the great ports of *Swansea*, *Cardiff*, and *Newport*.

The excellent quality of the South Wales coal and the position of the field on a great inlet opening out to the Atlantic Ocean and its bordering lands are special advantages. The former increases the demand for the coal, and the latter facilitates the import of raw materials and the export of coal and manufactures. Both South America and the countries of the Mediterranean are singularly lacking in coal and South Wales is in an excellent position to satisfy their requirements.

The coalfield is the site of *great metal industries*. Iron ore, obtained chiefly from northern Spain, is smelted at many places, notably at *Newport*, *Merthyr Tydfil*, *Tredegar*, and *Dowlais*. Tin, imported in ingots and bars from Malaya and in ore mainly from Bolivia and Nigeria, is made into tin plate at *Swansea* and throughout the surrounding district, where there is also a large tin smelting industry of the imported ore. *Copper*, *silver*, *nickel*, *lead*, and *zinc* also are smelted in this district.

THE NORTH WALES COALFIELD, extending with intervals from north Flintshire into Shropshire, can in no way compare with the South Wales field. The coal is sent largely to the Cheshire towns, but local iron ores are smelted at Wrexham and Northwich. At Flint, *artificial silk* is manufactured.

With the exception of the industries of the south, Wales has few manufactures. The only other manufacturing industry is that of *flannel* and other woollens, the chief centres being *Welshpool* and *Newtown*, in the upper Severn valley.

Industries of the Scottish Coalfields.

THE FORTH AND CLYDE COALFIELDS are four in number :—

The *Ayrshire field* has deposits of iron ore and consequently has an important *iron and steel industry*. The local supplies of ore, however, are now insufficient for the requirements of the industry and much is imported from Spain. At *Kilmarnock*, which is the chief town of the field, locomotives and rolling-stock are manufactured, and at Ayr *shipbuilding* is carried on. In addition to iron and steel, however, there is an important *woollen industry*, and *Kilmarnock* has many mills and is noted for the manufacture of carpets.

Much of the coal of this field is exported through *Ayr* and *Ardrossan* to Northern Ireland.

The *Lanarkshire field* is much the largest and most important of the Scottish coalfields. As in the Ayrshire field, iron ore is found, though not in such important quantities, and there is a great *iron and steel industry*. All the chief towns have important engineering and smelting works, but the principal centres are *Glasgow*, *Airdrie*, *Coatbridge*, *Motherwell*, *Hamilton*, and *Falkirk*. *Motherwell* is famous for its steel roof and bridge work, and *Glasgow*, though carrying on engineering in all its branches, is noted for the manufacture of locomotives.

Shipbuilding is another great industry of this coalfield, and, indeed, the lower Clyde is the greatest shipbuilding district in the world. All the towns from Glasgow to the Firth of Clyde are important centres, notably *Glasgow, Clydebank, Dumbarton, Port Glasgow, and Greenock.*

The Cotton Industry also is important, as the damp climate is favourable and supplies of the raw material are easily obtained from America, to which Glasgow is nearer than is Liverpool. Spinning is important at *Glasgow and Paisley*, the latter having a great cotton thread industry to which has now been added artificial silk.

Other industries of this field are *sugar refining at Greenock*, and the manufacture of *pottery, chemicals, and woollens at Glasgow.*

The Fifeshire field supports an important *linen industry* of which there are several centres. Fine linen goods are made on the coalfield at *Dunfermline and Kirkcaldy*; and coarse linens and sail cloth at *Arbroath and Montrose* on the Forfarshire coast to the north, to which the coal is easily transported. The flax and linen yarn for these manufactures are imported from the neighbouring countries of the continent. Oil-cloth, sacking, and other articles made from jute are manufactured on the coalfield at *Kirkcaldy*, and at *Dundee*, to the north on the Firth of Tay.

Other industries supported by Fife coal are the *jam and marmalade manufactures of Dundee* and the *dyeing and bleaching works of Perth.* Large quantities of coal are exported, and in exchange flax, linen yarn, timber, and grain are imported at the Forth ports.

The Midlothian field, a small coalfield on the opposite side of the Firth of Forth in the county of Edinburgh, supplies both Edinburgh and Leith and the towns of the Tweed Valley. *Edinburgh*, the capital of Scotland, manufactures *paper*, and has a large *printing and publishing* trade. There are also *breweries, distilleries and linen mills.*

The chief centres of the Tweed woollen industry are *Hawick, Jedburgh, Galashiels, Kelso, and Selkirk.*

Irish Industries.

NORTHERN IRELAND is much the most important industrial region of Ireland, the industries being carried on mainly in the north-east, where coal may be obtained most easily from the Ayrshire and Cumberland coalfields.

The linen industry, supported to some extent by local flax but chiefly by fibre imported from the Baltic countries, is the most important. The chief centres are *Belfast, Londonderry, and Lisburn.*

Shipbuilding is important at *Belfast*, the main supplies of coal, iron, and steel being at present obtained from the Ayrshire

coalfield. Both iron ore and aluminium ore are found in *Antrim*, but neither are smelted locally ; the iron ore is sent to Ayrshire and the aluminium ore to *Foyers* and *Kinlochleven*.

THE IRISH FREE STATE has few manufacturing industries owing to its poverty in coal and its distance from sources of supply. *Dublin*, the capital of the dominion, alone of the towns is important industrially. Here there are several manufacturing works and *brewing* and *whisky distilling* are important. Elsewhere cattle-rearing and agriculture are the chief occupations.

CHAPTER VI

THE BRITISH ISLES ; BRITISH COLONIES IN THE MEDITERRANEAN

THE BRITISH ISLES

TIDES AND FISHERIES

BOTH the tides and the fisheries of the British Isles are affected to a marked degree by the shallowness of the surrounding seas, and the islands owe many outstanding advantages in this respect to their situation on the continental shelf of Europe. Some of these have already been mentioned in discussing the position of the British Isles.

The Tides of the British Seas.

Tides are due to the rising and falling of the waters of the oceans and seas. The motions of the moon produce slight differences in the force of gravity in different parts of the earth. These differences have no perceptible effect on the solid globe, but are sufficient to deform the water covering, with the result that the water is heaped up in two waves on opposite sides of the earth, while midway between the two wave-crests are troughs of low water. These crests follow the course of the moon round the earth once in about twenty-five hours, and thus at every place on the ocean high and low water succeed each other at intervals of about $6\frac{1}{4}$ hours. The sun also has a tide-raising effect, but as the sun is so much farther from the earth than is the moon, its effect is less than half as great. Hence the solar tides have no independent existence, but either increase or diminish the height of the lunar tides according to the phases of the moon. When the effect of the sun reinforces the effect of the moon, *i.e.*, when the sun, moon, and earth are in a straight line (at full moon and new moon), unusually high tides, known as *spring tides*, occur. When the effect of the sun counteracts that of the moon, *i.e.*, when the sun and moon are at right angles to each other (at the half-moons), unusually low tides (*neap tides*) occur.

The tidal wave reaches these islands from the west and divides into two parts when it meets Ireland. One branch travels round the north of Scotland, after sending an off-shoot into the Irish Sea, and gives rise to a wave which passes from

north to south down the eastern coast of Great Britain. The southern part of the wave from the Atlantic is divided by the Cornish peninsula into two parts. One part goes up the Bristol Channel and the Irish Sea, and at Liverpool meets the branch which enters the Irish Sea from the north. The other part passes up the English Channel and reaches Dover at about the same time as the other reaches Liverpool. As the tide can enter the channel between the Isle of Wight and the mainland at both ends, there are four high tides a day in that area, and this fact is of great commercial advantage to towns like Southampton. Meanwhile, the wave which is passing down the eastern coast of Great Britain has only just left the main northern current near the Pentland Firth, and it takes about 12 hours to reach the mouth of the River Thames. Its arrival at that point, therefore, coincides with the arrival of the high tide from the English Channel and, consequently, the seaports of that neighbourhood get strong tides which greatly assist in keeping the harbours free from silt.

In the open ocean there is nothing to interfere with the movements of the water and the difference between high and low tide is but a few feet. When the tidal wave enters a shallow sea, however, the front of the wave is retarded, the waters are piled up and the height of the wave increases. Owing to the shallowness of the British seas, therefore, the tides experienced by the islands are considerable, the difference between high and low water amounting in many parts to 30 feet or more.

When the tidal wave enters a channel or gulf which not only shallows but also becomes narrower, the tidal effect is even more marked. The height of the wave is increased in two ways: (1) by the heaping up of the water due to the decrease in speed; and (2) by the decrease in the space available, as the gulf narrows inwards, causing a compensatory increase in the height of the wave. Thus, at Bristol the difference between high and low water during spring tides is 42 feet. In Canada, the difference between the high and low tides of the Bay of Fundy is even greater, being as much as 70 feet.

The high tides, with the currents they set up, are of immense benefit to the British Isles. Twice a day they provide deep water for shipping, enabling vessels to proceed far up the estuaries. Also, they keep the harbours and river mouths free from accumulations of rock waste and, by their strong action, keep clear the straits and channels round the coasts.

Fisheries of the British Isles.

The most valuable fisheries of the world are found in the temperate regions where the water is shallow, the floor of the sea is sandy and undulating, waste materials from the land are plentiful, and tides effect the mixture of waters of differing

temperature and salinity. Such conditions are found off the coasts of the British Isles, where the fisheries in consequence are of great value and give rise to an important fishing industry. The North Sea, the Irish Sea, the English Channel, the Bristol Channel, and St George's Channel all are shallow, and in few places round the British Isles is the sea much more than fifty fathoms in depth. Further, to the west of Ireland, well beyond the edge of the continental shelf, there are two elevations of the sea-floor, and north from the Shetlands the shelf is continued to join the Faroe Islands by an elevation known as the Wyville-Thompson Ridge. Round the Faroes are extensive banks which are again continued to the north-west to connect with the banks round Iceland. All the shallow seas and the comparatively shallow waters over these elevations in the deeper waters are very important fishing grounds.

Throughout these areas the sea-floor is relatively uniform, and is everywhere composed of materials eroded from the adjacent land. Near the land, the gravel, sand, and mud of which it is composed are mixed with materials of organic origin, particularly attractive to fish. These conditions prevail in what are known as the Home Fishery Regions—*i.e.*, the North Sea, the Irish Sea, the St George's, Bristol and English Channels, the shallow waters off the northern, western, and southern coasts of Ireland, and the banks off the coast of Galway. Over almost the whole of this great tract (more than 400,000 statute miles in area) fishing in some form or other is important. Trawling is carried on where the bed of the ocean is composed of soft materials unmixed with rocks or large stones, and, elsewhere, fishing is conducted by line, or drift or trammel nets, floating clear of the bottom.

The Home fisheries, particularly the seas and channels, are the traditional British fishing grounds, but the advent of the steam fishing vessel has greatly extended the field of activity, and the British fishery area now extends over more than a million square miles, from the coastal waters off Morocco, in the south, to the Arctic Ocean, in the north.

The fishing industry gives employment, either directly or indirectly, to about a twentieth of the total population of the British Isles and involves a capital investment of some £200,000,000; the total value of the produce, after allowing for the curing, preservation, and preparation of the fish in various ways, *e.g.*, by canning and manufacture into pastes, approaches £50,000,000, and fishing is second only to agriculture among British industries.

Fish of many different kinds are taken in the various British fisheries. They may be divided into two classes: those found on or near the sea-floor and those caught at or near the surface. The former class is the larger and includes haddock, brill, sole, plaice, halibut, turbot, and cod. The second class includes

pilchards, herrings, mackerel, and sprats. Fish migrate in search of food. Thus in early spring, the herring, a cold-water fish which lives near the surface, is caught off the Norwegian coast. In the spring, food is plentiful off the west coast of Scotland and the fishing fleets follow the shoals from the Irish Sea to the Hebrides and Shetlands. In summer, the shoals are plentiful off the east coast of Scotland, and in autumn they appear off Yarmouth and Lowestoft. It is clear, therefore, that the Yarmouth and Lowestoft fleets cannot be employed in herring fishing during the early part of the year, and during that season they sail to the Devon and Cornish coasts in search of mackerel. The hake is found in winter months off the coast of Morocco, and is followed northwards along the coasts of Portugal to the west of Ireland, and finally to the Firth of Clyde. The cod is a cold-water fish which moves southwards in the same way as the herring, reaching the south coast of Ireland and the North Sea. Pilchards are found in the warmer waters of the English Channel, but are chiefly caught when young off the coasts of Brittany and preserved as "sardines" (*cf.* young herrings in the Norwegian fiords). The sole is caught chiefly off the south coasts of England.

Though the fishing regions visited by British ships are so extensive, the industry is centralised at few large ports. The most important of these are Grimsby, Hull, London, Lowestoft, Yarmouth, Fleetwood, Milford, North Shields, and Aberdeen, most of these great centres being situated on the North Sea. This is the greatest of British fishing grounds, and the famous Dogger Bank, rising to within 60 feet of the surface, in the centre of the sea, literally teems with fish. The west and south coasts of Britain are, comparatively, of small importance and Ireland, too, has no great fishing centre, the Irish seas being extensively worked by vessels from Fleetwood, Cardiff, Milford, and Liverpool.

SEAPORTS

Owing to the many indentations in the coastline of the islands, the British Isles possess a wealth of excellent natural harbours and many ports of great importance. Every harbour, however, with natural advantages is not an important seaport, for there are plenty of excellent harbours of little or no economic importance.

The Conditions of a Great Seaport.

It is *trade* which makes the port and not natural advantages. Perhaps the best natural harbour of the British Isles is Milford Haven, but the port is, relatively, of little importance. On the other hand, Manchester, an inland city, has been made, at enormous expense, into one of the chief ports of the country.

In the former case, the harbour has a poor hinterland and lies off the important trade routes of the islands. In the latter, Manchester is the centre of an extremely rich and thickly populated industrial region requiring vast quantities of raw materials and food-stuffs and exporting large quantities of manufactured goods. It lies on important inland trade routes, and is also a great centre for trade with foreign countries, particularly with North America.

It may be said, therefore, that the two essential conditions of a good seaport are : (1) it should have a rich hinterland carrying on a large trade—the *bigger the trade the bigger the port* ; and (2) that it should lie on an important trade route. If the advantages of protection from wind and wave, deep water in the channels and close to the shore, abundant anchorage room and plenty of space for docks are present, in addition, so much the better. But, provided the essential conditions are satisfied, these advantages can be dispensed with. Commercial or industrial enterprise may with scientific assistance, by dredging, constructing sea-walls, moles, etc., create an artificial port of far greater importance than one having all such advantages naturally.

British Seaports Classified.

The chief ports are, therefore, with certain exceptions, those which are outlets for the industrial regions of the coalfields. The chief ports of the British Isles may be classified as follows :—

London and Southampton.

Ports which are Outlets for Coalfields.

Dublin and Belfast.

London and Southampton.

LONDON, both the largest town and the greatest port of the British Isles, lies at the head of the most important estuary of England, the Thames, which is almost opposite the mouths of the Scheldt and the Rhine. From earliest times these two rivers have been great sources of European commerce and civilisation, and their proximity therefore affected London's early growth. The choice of the site of the city was due to the fact that it was the lowest place where firm ground was found on both sides of the marshy shores of the Thames estuary. Hence the Romans built a bridge at the spot which marked the limit of sea transport, and made it of early importance as a transshipping point. The value of the site of the port was further increased by the great Roman road from Dover, which passed between the marshy shores of the Thames on the north, and the North Downs and thick Weald Forest on the south, causing all traffic from the Continent to pass through London, whence a series of roads radiated all over the more open country to the north and west. In addition, it was

the agricultural areas which were important and London was the centre of agricultural England.

These geographical factors made London the capital of the country and the seat of the Government. Population and commerce have increased, and it has developed as the chief railway centre and also the headquarters for retail trade and distribution to all parts of the world.

London is a great port of transshipment and produce reaches the port from all parts of the world, for much of the world's produce is sent in large consignments to great central ports—*entrepôts*, as they are called—where it can be easily and most economically re-distributed to its final destinations. In this way London has become the greatest *entrepôt* in the world and large amounts of her imports are re-exported. Thus, she is a world market for tea, coffee, and many raw materials, such as wool. This great world trade makes London of great importance as a commercial and financial centre. In addition she has innumerable manufactures, mainly those dependent on the demand of her immense population. Such are jam, confectionery, clothes, footwear, and furniture manufactures, brewing, and soap and chemical works.

London, as a port, has, however, two great drawbacks. The first is that the specially high tide, due to the meeting of the tides from the North Sea and English Channel off the Thames estuary, though giving a high water channel of 50 feet up to Tilbury, is too strong. The second is historical in character. Owing to the early development of London, her river-front was occupied by wharves and the land behind it by warehouses long before the railway era. The coming of railways, therefore, found the centre of the port closed to them and the railway termini are thus situated some distance from the wharves. Further, with the increase in the number and size of the ships, new wharves and docks were constructed farther down the river, but with increase in distance from the centre of the city their value decreased. If the large ships ascended to the "Pool," at London Bridge, the wharves could not accommodate all of them and, also, some of the larger ships had to lie out in mid-stream. London perforce became a barge port, with a fleet of fully 12,000 barges which carry the cargoes from the ships up to the Port of London.

The trade of the port is, however, enormous. At London are received about a third of the British imports and she consigns about a quarter of the total exports.

SOUTHAMPTON, lying at the head of the deep and sheltered harbour of Southampton Water between the estuaries of the Test and Itchen, has, like London, been important from early times. It has two essential advantages: its double front and its double tide. The former, due to the peninsular situation of the town between two estuaries; the latter, due to its receiving

the same high tide *twice*. The tide advancing up the English Channel enters first by way of the Solent, and again, two hours later, by Spithead. (See Fig. 20.) This gives Southampton *four* high tides a day and prevents the occurrence of the normal low water minimum, thus permitting ships to enter and leave at any time. Further, the tides are not accompanied by strong

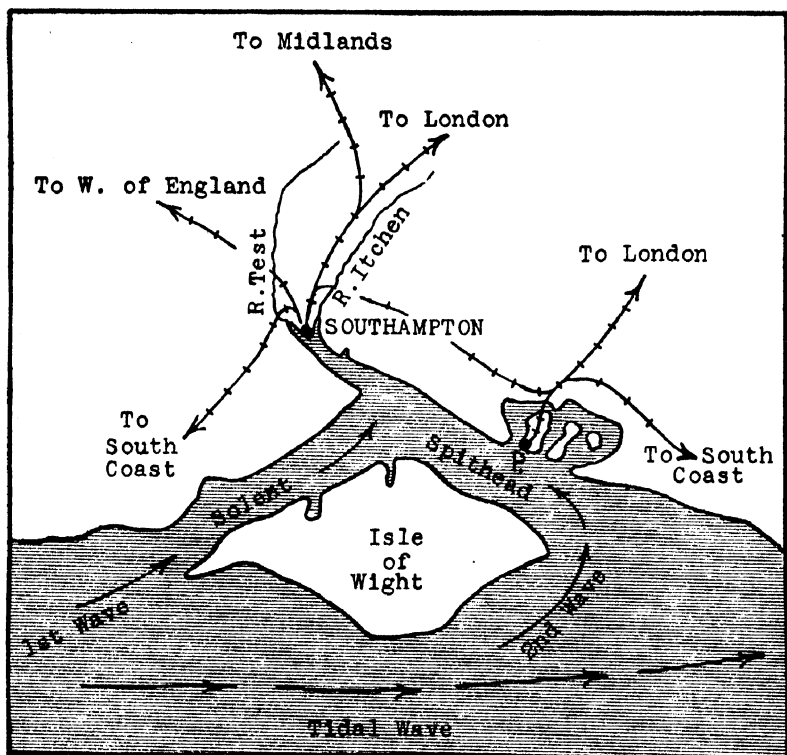


FIG. 20.—THE POSITION OF SOUTHAMPTON.

currents as they are at London, and the safe shelter of the Solent is easy to gain from the Channel both by day and night. All these conditions give Southampton marked advantages over London and other rival ports. Further, when cargoes have to be transhipped, it makes little difference whether they are transhipped far down the Thames or up Southampton Water, and, indeed, if Southampton is used, the long and hazardous detour *via* the foggy and congested Straits of Dover is avoided. This is an important consideration both as regards reduction of insurance charges and speed of transport—a matter of special importance in the case of mails, meat, fruit, vegetables, and dairy produce.

These important advantages have caused the rapid development of the port, which now has first-class facilities, including the largest dry dock in the world and excellent railway connections with all parts of Britain, and a very large traffic both in cargo, especially of the perishable type, mails, and passengers. Its importance as a military port has been particularly noticeable this century. Many great shipping lines, including the White Star (serving America) and the Union Castle (serving South Africa), now use Southampton in preference to London.

Ports which are Outlets for Coalfields.

CARDIFF is the greatest coal port in the world, particularly from the point of view of the quality of the coal and the amount exported and sent out for bunkering purposes to all parts of the world. It lies at the mouth of the river Taff, and behind the port converge the narrow valleys which provide such easy access to the heart of the South Wales coalfield. Like all the other great coal ports, Cardiff is able to import cheaply the raw materials required for the industries of its hinterland, because it can always provide return cargoes for steamers entering the port. Its wealth, which has made possible the construction of its fine docks, has been built up largely on its export trade in steam coal and anthracite. Its import trade is much less important than its export trade, for its imports consist largely of food-stuffs, iron ore, and timber. It is, however, the second timber importing port (after London) of the British Isles, and has large flour milling industries.

NEWPORT, at the mouth of the Usk, the deepest tidal river with floating docks in the British Isles, is becoming a serious rival of Cardiff. It serves the part of the coalfield which has been least exploited, whereas Cardiff is the outlet for that part which was first worked.

SWANSEA, situated on a bay affording a spacious, sheltered and safe anchorage, is an important port in connection with the South Wales metal industries, though coal, as in all the ports of this region, is of great importance, but it is also a great industrial centre. Its rapid progress has depended mainly on the manufacture of tin-plate, Swansea and its immediate hinterland producing more than two-thirds of the total British output of this commodity, representing a value of over £5,000,000. The imports include tin, copper, silver, lead, nickel, and iron. The chief exports are tin-plate, coal, patent fuel, and coke, copper, zinc, iron, and steel.

BRISTOL was of importance long before the Industrial Revolution, and seamen of the port played a prominent part in the discovery and colonisation of new lands. It was from Bristol that John Cabot, the first European to reach the shores of North

America since the days of the old Norsemen, sailed in 1497. The discovery of the New World gave an early impetus to the development of the port, and it is still the chief British port for trade with the West Indies. Bristol is nearer to America than is either Liverpool or Southampton and nearer to London than either Liverpool or Fishguard. These advantages led to the construction of the fine docks of *Avonmouth*, eight miles down the river from Bristol, and the improvement of the river channel.

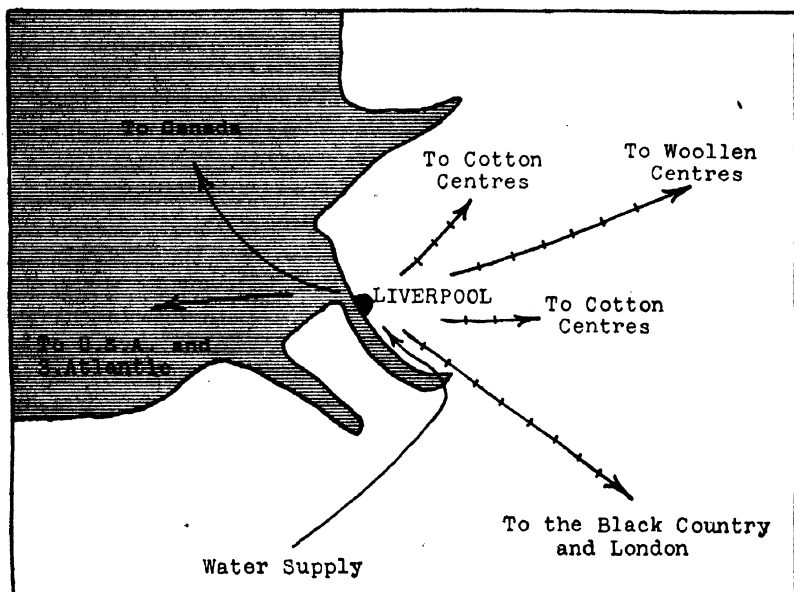


FIG. 21.—THE POSITION OF LIVERPOOL.

Cargo boats carrying up to 6,000 tons can now thread the gorge to the heart of the city.

The port suffers the great disadvantage of having a relatively thinly peopled and limited hinterland. The principal imports include grain, provisions, oils, hides, bananas, sugar, cocoa, tallow, tobacco, and petroleum; the exports, coal, iron and steel goods, oil, chemicals, jams and preserved fruit.

LIVERPOOL received the impetus for its growth from the Lancashire cotton industry and thus developed relatively late. Such ports as Bristol, Plymouth, London, and Southampton had, therefore, a great advantage over it in this respect. In the volume of its trade, however, it now ranks almost equal with London, and through it pass a quarter of the British imports, more than two-fifths of the exports, and nearly a third of the entire foreign trade of the British Isles.

The port stands at the sea end of the Mersey estuary (Fig. 21)

and has a magnificent system of docks extending along the estuary for $6\frac{1}{4}$ miles. With MANCHESTER, it serves not only the great Lancashire industrial region, but also the industries of the West Riding of Yorkshire, and indeed is the principal port in Great Britain for the Atlantic trade.

The interests of Liverpool, unlike those of Manchester, are world wide. Manchester's one dominant interest is cotton; Liverpool, "The Home of Ship Owners", handles commodities from every part of the world and is not restricted in its interest to any one group. It is these conditions which free the port from any serious competition from Manchester.

Chief among the many imports are raw cotton, grain, meat, hides, dairy produce, rubber, palm oil, and tobacco; the exports are chiefly cotton and woollen manufactures, metal goods and textile machinery. In addition to the trade in merchandise, regular passenger liners run from Liverpool to every important port in the world, and every year large numbers of tourists and emigrants pass through the port.

If BIRKENHEAD, on the opposite bank of the estuary, be included as part of Liverpool, the city disputes with Glasgow for the rank of second largest town in the British Isles. It has excellent railway connections with all parts of Britain, and is an important manufacturing centre, having varied activities, including the manufacture of ship requisites and the working up of raw materials obtained from the Americas—*e.g.*, tobacco, hides (into leather), tallow (into soap), and fruit (into jam). Also, at Birkenhead, there are important shipyards.

THE CUMBERLAND PORTS of Workington, Whitehaven, and Maryport all lie off the important trade routes and have a relatively poor and thinly populated hinterland. Though they share with the ports of north Lancashire in what is known as the west coast iron and steel industry, they are, therefore, of comparatively small importance.

THE TYNE PORTS serve a thickly peopled manufacturing district, and from NEWCASTLE, at the head of ocean navigation of the river, to TYNEMOUTH, they are all important. The whole Tyneside region is famous for coal, chemicals, ships, and machinery. As in the case of the South Wales ports, the plentiful supplies of coal for loading up outward bound ships allow of the importation of raw materials and food-stuffs on the most favourable terms, and a busy and extensive hinterland make such importation profitable.

Newcastle has excellent rail communications with the north and south by the L.N.E.R. main line and with the west coast through the Tyne Gap. (Fig. 22.) Here the banks of the river are high and facilitate the loading of colliers, the loaded trucks hauling the empty ones back to the level. "Newcastle," by

which, in this connection, is understood all the Tyne ports, is a rival of Cardiff for the position as the greatest coal port in the world, but whereas Cardiff has, from this point of view, the advantage of a very large foreign trade, Newcastle coal is used largely in the shipping trade and the extensive coastal trade, her exports of coal being confined mainly to the coalless regions of southern England, notably London. The quality, too, of Newcastle coal, while excellent, does not come up to the standard of Cardiff coal.

The chief imports of Tyneside ports are food-stuffs, iron ore,

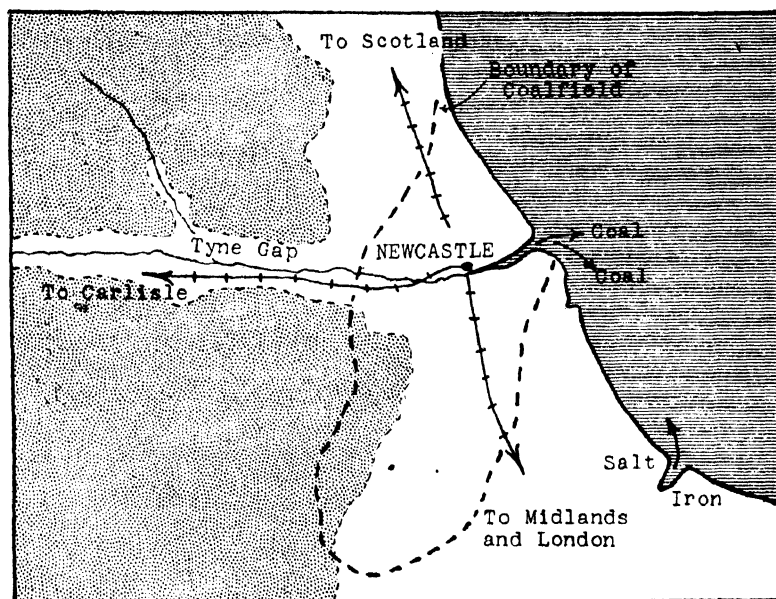


FIG. 22.—THE POSITION OF NEWCASTLE.
Land over 300 feet shaded to show the Tyne Gap.

and pit props; the exports, coal, iron and steel goods, ships, glass, and chemicals.

THE TEES PORTS.—Of these the chief is *Middlesbrough*, which is the port for the greatest iron-smelting region of the British Isles. Much iron ore is imported, notably manganese iron ore from India. Iron and steel goods and ships are the most important exports from this region.

Other Northumberland and Durham ports of importance are *Blyth*, important for the export of coal; and *Sunderland*, on the Wear estuary, which exports coal and ships.

THE HUMBER PORTS of Hull, Grimsby, Goole, and Immingham, the last two of recent and modern construction, all are important,

but HULL, with its docks right up in the midst of the town, is easily the chief. It has a densely populated industrial and agricultural hinterland with which it has excellent communications by rail, road, river, and canal. The estuary, which forms a magnificent harbour, faces the estuaries of the Elbe and Wessex and the Kiel Canal, and there is an enormous trade with the north European countries. The imports of the Humber ports, coming mainly from the north of Europe, include grain (from Russia, and America also), timber, flax, and hemp (both fibre and seeds), soya beans, dairy produce, and beet sugar. The nature of these imports is reflected in the industries of the Humber towns: flour milling, soap, margarine, sauce, cattle cake, paint and varnish manufacture, and the making of confectionery. Hull has the second greatest oil-seed industry in the world, but it has lost much of its timber and fish trade to Grimsby and Immingham.

The fishing industry is of special importance to the Humber ports, for they lie within easy reach of the Dogger Bank.

GRIMSBY has not such a good natural situation as the other ports, but it lies nearer the open sea and, consequently, the fishing grounds. The port was developed by the Manchester, Sheffield, and Lincolnshire Railway (absorbed in the Great Central and eventually in the London and North-Eastern system), specially for the fish trade. The value of the fish brought into Grimsby is now more than three times that entering Hull and almost equals that of all the fishing ports of the whole east coast from Berwick to Dover. Grimsby is thus yet another example of the power of commercial and industrial enterprise. Naturally, it has a poor, thinly populated hinterland, but this great disadvantage has been overcome by the provision of first-class railway facilities, which place it within easy and rapid reach of London and all the great industrial towns of the Midlands. The catches of its many trawlers are distributed by special fish trains which are run every night.

The exports of the Humber ports are varied, as is to be expected from the great extent of the hinterland. They include coal, woollens from the West Riding, cottons from Lancashire, pottery, leather, silks, lace, and hosiery from the Midlands, and iron and steel goods from the Sheffield district.

GOOLE, a rapidly developing port on the Yorkshire side of the Humber estuary where the river Don flows into the Ouse, has regular steam communication with London and the principal continental ports. Coal, stone, woollen goods, and machinery are exported, and indigo, butter, fruit, logwood, timber, and wool imported. Industries, too, are developing—alum, sugar, rope, agricultural instruments, and also shipbuilding.

IMMINGHAM, unlike Goole, which originated in 1696, is of very recent growth. Situated on the Lincolnshire coast to the

north of Grimsby, it has a fine deep harbour which was constructed by the Great Central Railway Company, now part of the L.N.E.R., between 1906 and 1912. Its docks have been specially designed to deal with the coal, timber, wool, and grain trades, and the site was chosen because the deep water channel of the Humber leads right to the dock gates, and thus keeps the harbour clear of silt, and allows ships to enter and leave at any time. The original Immingham was a small hamlet away from the coast, but a new town is growing up on the docks.

SCOTTISH LOWLANDS PORTS.—The industrial regions of the Scottish Lowlands are served by several important ports. On the west, Glasgow and the Clyde ports generally have a very large trade, and on the east the ports of the Firth of Forth also are of great importance.

GLASGOW, as a first-class port, is the product of the artificial deepening of the Clyde, which has enabled the largest vessels to reach the city. It has, however, outports at *Port Glasgow* and *Greenock*. The surrounding region is rich both in coal and iron ore and the Clyde has become the greatest shipbuilding region in the world. There are, also, extensive industries, notably iron and steel, chemical, woollen, leather, distilling, furniture, and cotton, and though any of these, even cotton, for the climate has the necessary damp quality also natural to Lancashire, could be developed extensively, this district has the greatest advantage in shipbuilding.

Glasgow imports, chiefly, grain and flour, iron ore, fruits, bacon and hams, oils, and timber; the chief exports are iron and steel goods, ships, cotton goods and yarn, linen goods, spirits, jute and woollen goods, chemicals, and coal.

LEITH, on the Firth of Forth, is the port of Edinburgh, and is, like Glasgow, the outlet for a great industrial region. It imports, sugar, grain and flour, dairy produce, flax, linen yarn, woollen and worsted yarn, iron ore, and timber; the exports are coal, coke, and manufactured fuel, fish, iron and steel goods, cotton manufactures and linen manufactures.

Both these ports serve the whole Lowlands, their hinterlands covering the same ground. Glasgow imports from and exports to the countries of the west all the products of the Lowlands of Scotland, being specially important for the trade with America, and Leith trades chiefly in the same goods with the north European countries.

Other important ports of the Lowlands are *Grangemouth*, *Kirkcaldy*, *Methil*, and *Burntisland*, on the Firth of Forth; and *Dundee*, on the Firth of Tay.

Irish Ports.

Ireland has few important ports, owing to its poverty in coal and iron and, consequently, in manufacturing industries.

In NORTHERN IRELAND, *Belfast* is the chief port. The town is situated on a well-sheltered, deep estuary, but has a comparatively poor hinterland, and the shipbuilding industry localised there is due rather to economic than geographical factors. It is true that the coal and iron of the Ayrshire and Cumberland coalfields are within easy reach, but this alone would not be sufficient to enable Belfast to compete with the Clyde and Barrow yards. The industry is in fact encouraged in other ways. The great shipping firm of Harland and Wolff has an agreement with Belfast whereby it is exempt from the payment of rates, a great saving of expense to the firm and, therefore, an excellent reason why it should make the city its headquarters. Further, while the selling agreement of the steel manufactures of Scotland and northern England maintains a high price for steel in England, Ireland does not come within its scope, and the Belfast shipbuilders are able to obtain their requirements as cheaply as, if not more cheaply than, the Clyde shipbuilders.

Belfast has an important outport and mail-packet station in *Larne*.

In the IRISH FREE STATE, *Dublin* is the chief port. The town is, like Belfast, admirably situated for trade with Great Britain, with which the bulk of the trade of both ports is carried on. It is situated on a bay which makes a fine harbour and it has excellent inland communications. For mails and fast passenger traffic, however, the port of *Kingstown*, six miles down Dublin Bay, is used.

Other ports of the Irish Free State are *Cork* and *Waterford*, both sending large quantities of cattle, bacon, butter, and eggs to Great Britain, and *Queenstown*, situated on an island in Cork Harbour, an important port of call for Atlantic liners.

Other British Ports.

The chief PACKET STATIONS of Great Britain, with the railways serving them, as follows :—

CONTINENTAL SERVICE

<i>Railway Company.</i>	<i>British Port.</i>	<i>Service to</i>
L.N.E.R.	Harwich	{ Hook of Holland,
	Hull	{ Antwerp, Esbjerg
	Grimsby	{ Zeebrugge
	Newhaven	{ Antwerp
	Dover	{ Dieppe
S.R.	Dover	{ Calais
	Queenborough	{ Ostend
	Folkestone	{ Flushing
	Southampton	{ Boulogne
		{ Havre

CONTINENTAL SERVICE—*continued*

<i>Railway Company.</i>	<i>British Port.</i>	<i>Service to</i>
G.W.R. } S.R. }	Weymouth	Channel Islands
L.M.S.	Goole	Flushing
ALL	London	Dunkirk

IRISH SERVICE

L.M.S.	{ Holyhead	Dublin
	{ Fleetwood	Belfast
	{ Heysham	Belfast
	{ Stranraer	Larne
G.W.R.	Fishguard	Rosslare
S.R. }	Plymouth	Cork
G.W.R. }		

The chief NAVAL STATIONS are :—

In *England*.—Portsmouth, on Spithead ; Chatham, on the estuary of the Medway ; and Devonport, with Plymouth, on Plymouth Sound. The last named port is also of importance for the landing of passengers and mails from liners proceeding up the Channel to Southampton or London.

In *Wales*.—Pembroke Dock, on Milford Haven.

In *Scotland*.—Rosyth, on the Firth of Forth ; Kirkwall, on Scapa Flow, in the Orkney Islands ; and Cromarty, on Cromarty Firth at its entrance from Moray Firth.

In the *Irish Free State*.—Berehaven, on Bantry Bay.

POPULATION

Until the Industrial Revolution, when steam power generated from coal changed all the conditions of manufacture, the south-eastern counties of England, grouped radially round London, were the most populous parts of the British Isles and market towns were the centres of concentration. These are the most fertile parts of the country, and, as before the Industrial Revolution, a man had to live where he obtained his food, the south-east of England was able to support a greater population than any other part. Also, at this time, and even later, America was commercially unimportant and the south-east was in closest proximity to the commercial centres of the Continent. It was not until much later that position in relation to America became important and gave the north-east a distinct advantage, in this respect, over the south-east.

The chief factor in the explanation of the distribution of the population to-day is the localisation of industries, for population follows manufacture. It is no longer necessary for men to live where their food is produced, for the application of mechanical power to transport has resulted in such development that a man's "home space" may be very widely separated from his

"food space." This has made possible the great and rapid expansion of towns and industries on the coalfields. Thus the most densely populated districts of the British Isles to-day are South Lancashire, the West Riding of Yorkshire, the Tyne region, Staffordshire, the Scottish Lowlands, South Wales, and the Metropolitan commercial area, all of which, with the exception of the last named, are highly industrialised coal-mining districts. The worker goes where he can most profitably give his services, i.e., in the industrial areas where the demand for labour is large and continuous.

It is clear that pastoral occupations will not give employment to so many people as agriculture, while neither will employ anything like the numbers required in manufacture. The pastoral areas of the British Isles, e.g., the Welsh Hills and the Highlands and Southern Uplands of Scotland, are, therefore, the most thinly populated parts, while the agricultural districts occupy an intermediate position.

In parts of the islands where all three types of occupations are important there is a marked difference in the distribution of the population in the various regions, as in the case of the Plain of York and the industrial regions of the Yorkshire Pennines. Where, on the other hand, there are no highly industrialised coal-mining regions the population is comparatively evenly distributed. This is so in Ireland, where only in a few small areas, the chief of which is round Dublin, is the population dense.

FOREIGN TRADE

The Foreign Trade of the United Kingdom.

The foreign trade of Britain is enormous. Every year we import vast quantities of food-stuffs and raw materials, in payment for which we export coal and manufactures, and render shipping, banking, and insurance services. In value, some four-fifths of our *exports* consist of manufactured goods, but, in bulk, coal is first. Our most valuable exports, in the order of importance, are cotton goods, iron and steel goods (including machinery and ships), woollens and other textiles, and chemical products.

Our *imports* can be dealt with in three groups—(1) food, drink, and tobacco; (2) raw materials; and (3) manufactures. Of these, the first accounts for nearly half the value, the second for about a third, and the last for the remainder—less than a fifth. Our most important imports and the chief sources of supply (given in order) in each case¹ are tabulated below. The countries of the Empire are printed in black type.

¹ Extracted from the Annual Statement of the Trade of the United Kingdom for 1925. It is perhaps necessary to point out that the average figures for the past five years or so would show a different result. Could the two tables be given, the changes taking place would be clearly seen, but space does not permit. The most recent figures available, therefore, have been given in order to show, as accurately as can be shown by figures for one year, the present position.

COMMODITY.	COUNTRIES.	PROPORTION FROM EMPIRE.
<i>Food, Drink, and Tobacco :—</i>		
Wheat . . .	Canada, United States, Australia, Argentine, British India	55%
Barley . . .	United States, Russia, Canada	26%
Oats . . .	Canada, United States, Argentine, Irish Free State, Chile	48%
Maize . . .	Argentine, British South Africa, Rumania	29%
Rice . . .	British India, Spain, Siam, United States	50%
Meat—		
Chilled . . .	Argentine, Uruguay	0.2%
Frozen . . .	Australia, Argentine, New Zealand, Uruguay, Brazil	56%
Bacon . . .	Denmark, United States, Canada, Irish Free State	23%
Butter . . .	Denmark, New Zealand, Australia, Argentine, Irish Free State	51%
Cheese . . .	New Zealand, Canada	88%
Fruit—		
Apples . . .	United States, Canada, Australia, France	44%
Bananas . . .	Colombia, Honduras, British West Indies, Canary Islands, Costa Rica	20%
Oranges . . .	Spain, Palestine, Cape of Good Hope	19%
Dates . . .	Iraq, France (re-export), Egypt	83%
Spices—		
Cinnamon . . .	Ceylon	98%
Ginger . . .	Sierra Leone, British West Indies, British India	89%
Pepper . . .	Straits Settlements, Java, British India	57%
Cloves . . .	Zanzibar and Pemba	95%
Cocoa . . .	British West Africa, British West Indies, Ecuador, Venezuela, Brazil, Ceylon	91%
Coffee . . .	Costa Rica, British East Africa, British India, Colombia, Brazil, Guatemala, Java	42%
Tea . . .	British India, Ceylon, Java, China	87%
Sugar . . .	Cuba, Holland, Czecho-Slovakia, United States, San Domingo, Canada, British West Indies, Australia, Mauritius, Peru	21%
Wine . . .	Portugal, Spain, France, Australia, Italy, Germany	7%
Tobacco . . .	United States, British India, Nyasaland, Syria, Greece, Canada, Rhodesia, Cuba, Turkey	10%

Raw Materials :—

Asbestos . . .	Rhodesia, Canada, Cape of Good Hope	99%
Graphite . . .	Madagascar, Japan, Ceylon, Italy, Germany	15%
Mica . . .	British India, Rhodesia, France	91%
Sulphur . . .	Italy, United States	1%
Iron Ore . . .	Spain, Algeria, Sweden, Norway, Tunis, France
Antimony Ore . . .	China, Chile, Australia	31%
Bauxite . . .	France, Italy, United States	6%

COMMODITY.	COUNTRIES.	PROPORTION FROM EMPIRE.
Copper (ore, blocks, ingots, etc.)	United States, Chile, Spain, Canada, Tanganyika, British South Africa, Portuguese East Africa, Belgian Congo, Australia . . .	21%
Lead (ore and pig)	Australia, United States, Canada, Spain, British India, Mexico, Germany, Belgium, Holland . . .	62%
Manganese Ore . . .	British India, Russia, Portuguese India, Gold Coast, Brazil . . .	66%
Mercury . . .	Spain, Italy . . .	50%
Molybdenum Ore . . .	Australia . . .	100%
Monazite Sand . . .	British India . . .	100%
Nickel Ore . . .	Canada . . .	100%
Silver Ore . . .	Chile, Canada, Peru, Spain, France, Bolivia, Transvaal, Australia, United States . . .	28%
Tin (ore and ingots)	Bolivia, Chile, Straits Settlements, Nigeria, Dutch East Indies, Peru, Portugal, Australia . . .	30%
Zinc (ore, oakes, slabs, and blocks)	United States, Australia, Belgium, Germany, Canada, Spain, Poland, France, Holland, and Sweden . . .	25%
Woods and Timber—		
Mahogany . . .	British West Africa, United States, French West Africa, British Honduras, Cuba, British North Borneo, British India . . .	42%
Oak . . .	United States, Poland, Japan, Italy, Yugoslavia, Irish Free State, Latvia, Russia . . .	1%
Teak . . .	British India, Siam, French Indo-China . . .	85%
Softwoods (firs, pine, spruce, etc.)	Finland, Russia, Sweden, Latvia, Canada, United States, Poland, Norway . . .	7%
Cotton . . .	United States, Egypt, British India, Peru, Brazil, British East Africa . . .	11%
Wool . . .	Australia, New Zealand, Union of South Africa, British India, Argentine, Chile . . .	85%
Silk . . .	China, Italy, United States, Switzerland, France, British India . . .	6%
Flax . . .	Latvia, Belgium, Russia, Esthonia, Holland, Irish Free State, British East Africa . . .	5%
Hemp . . .	Philippine Islands, British East Africa, British India, New Zealand, Italy, Belgium, Portuguese East Africa . . .	27%
Jute . . .	British India . . .	99%
Cotton Seed . . .	British India, Egypt, Brazil, Kenya, Anglo-Egyptian Sudan, Portuguese India, Turkey, Nigeria, Peru, Tanganyika . . .	48%
Linseed . . .	Argentine, British India, Russia, Latvia, Holland, Canada . . .	43%
Soya Beans . . .	China, Japan
Copra . . .	Straits Settlements, Fiji Islands, Nauru and British Samoa, Dutch East Indies, Philippine Islands, Australia, British West Indies, Ceylon . . .	81%
Ground Nuts . . .	French West Africa, British India, British West Africa (Gambia and Nigeria), China, Portuguese West Africa, Anglo-Egyptian Sudan . . .	58%
Palm Kernels . . .	British West Africa (chiefly Nigeria and Sierra Leone), French West Africa . . .	84%

COMMODITY.	COUNTRIES.	PROPORTION FROM EMPIRE.
Palm Oil . . .	British West Africa (chiefly Nigeria), French West Africa	86%
Petroleum (crude). . .	Persia, Dutch West Indies, Venezuela, Mexico, Peru, Russia, British West Indies, United States	0.3%
Hides . . .	Argentina, Union of South Africa, Brazil, Australia, New Zealand, Italy, Uruguay, Irish Free State	39%
Rubber . . .	Straits Settlements, Malay States, Dutch East Indies, Ceylon, British India, Brazil, Nigeria, French West Africa	79%

From the above, the following facts emerge with regard to the source of Britain's imports :—

(1) In the case of each of the following, 75 per cent. or over is obtained from the Empire :—

Food-stuffs, etc.—Cocoa, tea, cheese, ginger, cinnamon, cloves, dates.

Raw materials.—Rubber, wool, jute, copra, palm-oil and kernels, teak, asbestos, mica, monazite sand, nickel.

(2) Commodities of which between 50 and 75 per cent. is obtained from the Empire :—

Food-stuffs, etc.—Wheat, rice, butter, frozen meat, pepper.

Raw materials.—Ground nuts, lead, manganese, molybdenum.

(3) Commodities of which between 25 and 50 per cent. is obtained from the Empire :—

Food-stuffs, etc.—Barley, oats, maize, apples, coffee.

Raw materials.—Cotton seed, linseed, hemp, hides, mahogany, antimony, silver, tin, zinc.

(4) Commodities of which less than 25 per cent. is obtained from the Empire :—

Food-stuffs, etc.—Chilled meat, bacon, bananas, oranges, sugar, wine, tobacco.

Raw materials.—Cotton, silk, flax, soya beans, oak, softwoods, petroleum, graphite, sulphur, bauxite, copper, mercury, iron ore.

The Foreign Trade of the Irish Free State.

The trade of the Irish Free State is at present almost entirely with the United Kingdom. Especially is this true of exports, for, in 1925, the value of goods consigned to countries outside the British Isles was less than £1,250,000. In addition to the imports of goods of British origin, those of foreign produce are received chiefly from Great Britain, though there is now a

considerable direct import of wheat and maize. The degree to which the Irish Free State trade is bound up with that of the rest of the British Isles is shown by the following figures for 1925 :—

Exports :—

Great Britain . . .	£36,656,721	
Northern Ireland . . .	6,465,024	
Other countries . . .	1,249,103	
	<hr/>	£44,370,848

Imports :—

Great Britain . . .	£44,185,138	
Northern Ireland . . .	6,812,109	
Other countries . . .	11,915,983	
	<hr/>	62,913,230

TOTAL TRADE	<hr/> <hr/>	£107,284,078
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BRITISH COLONIES IN THE MEDITERRANEAN

The remaining parts of the Empire in Europe all lie in the Mediterranean Sea. They are Gibraltar, Malta and Gozo, and Cyprus.

Gibraltar.

Gibraltar is a rocky peninsula of Spain at the entrance to the Mediterranean which was captured from Spain in 1704. Since then it has been of the greatest importance as a base from which the British navy has controlled the most important Empire trade route, the Suez route to India. The great range of modern artillery, however, has greatly weakened its position as the key to the Mediterranean, for it now can easily be bombarded from Spanish ground and the shipping lying in the harbour be destroyed. A far stronger position to-day is that of Tangier, on the African coast, which formed part of the dowry of Katherine of Braganza on her marriage with Charles II., but which, after being garrisoned for twenty years as an English naval station, was abandoned on account of its expense. This is now under the joint control of France, Spain, and Britain, Britain's sole interest being in the maintenance of Tangier as an unfortified port subject to international control.

Gibraltar is a bare rock three miles long, three-quarters of a mile wide, and about a quarter of a mile high. It lies *near* the narrowest part of the strait, and is very strongly fortified. In area it measures less than two square miles, and, apart from its value as a naval base and a coaling, oiling, and cable station, it is of little economic importance. It has a good harbour, used by

ships of all nations, and moles, wharves, and naval docks have been constructed at great expense on the western side of the rock.

The climate is typically Mediterranean, the winter being mild and rainy and the summer hot and dry.

The following description, a translation of a passage from *Voyage en Espagne* by Gautier,¹ gives a very clear picture of Gibraltar.

"Picture an immense rock, or rather mountain, 1,500 feet high, rising sudden and sheer from out of the sea, upon a shore so low and flat as hardly to be noticed. There is nothing to lead up to it, nothing to account for it. It is linked to no other chain; it is a monstrous monolith. What adds still more to the effect of this extraordinary rock is its shape. It looks like an enormous stone sphinx, the work of some Titan sculptor. The outstretched parts form what is called Europa Point; its flattened head is turned towards Africa; the shoulders and hind quarters stretch towards Spain in fine curved lines, like those of a lion couchant. The town lies at the base, almost imperceptible, a mere detail lost in the mass. The three-deckers at anchor in the bay look like toys made in Germany—little imitation models of boats. Even the fortifications are not perceived. Yet the mountain is hollowed and mined and excavated in every direction; its recesses are full of cannon and shell and mortars; yet all that the eye discerns is a few imperceptible lines, mingling with the strata of the rock, and a few holes, through which the great guns thrust their furtive muzzles."

Malta and Gozo.

Lying in the comparatively narrow passage between Sicily and Africa, which connects the two basins of the Mediterranean, is a small group of islands belonging to the Empire. Of these MALTA is the chief. The island has an area of 92 square miles, and is thus only about two-thirds the size of the Isle of Wight. Its importance, however, is out of all proportion to its size, for not only is it an important coaling and oiling station, a cable and wireless station, and the base of the British Mediterranean fleet, but it is likely to prove of great importance as a landing and fuelling station on Empire air routes. While modern developments are detracting from the importance of Gibraltar, therefore, they are greatly enhancing that of Malta.

The island, typically Mediterranean in climate, produces considerable, but inadequate, supplies of foodstuffs, chiefly cereals, fruits, and potatoes. Apart from this there are no local products of any importance.

The capital and chief port is Valetta, situated on a magnificent

¹ From *Descriptive Geography from Original Sources*, by F. D. and A. J. Herbertson.

harbour on the north-east coast. Besides being an important naval station, Valetta is a great commercial entrepôt and handles a large volume of trade every year. The bulk of this, about nine-tenths of the total, is composed of transshipments, the actual Maltese trade being comparatively insignificant. The chief import from Great Britain is coal for the replenishment of supplies for bunkering.

Malta forms, with Gozo, the only other inhabited island of the group, a Crown Colony.

Cyprus.

The remaining British Mediterranean possession—also a Crown Colony—lies off the steamship routes, in the north-eastern corner of the Sea. It is, therefore, unlike Gibraltar and Malta in that it is neither a port of call nor a coaling station and has no regular steamship service with the British Isles. Its political importance to the Empire, likewise, is not so vital, for it is rather of the negative than the positive order. It lies in the fact that were the island occupied by a foreign power it might well be utilised as a base from which to strike at the Suez Canal. The products of the island, however, are of much greater importance than those of Malta.

Physically, Cyprus consists of two parallel mountain ranges running east and west, between which lies a relatively low area of fertile soil. The area of the island is some 3,600 square miles. The coastline is lacking in good harbours, and the streams are short and rapid and of no use for navigation.

The climate is of the usual Mediterranean type, and the vegetable products are those characteristic of it. Cereals, olives, and grapes all are important, and caroub beans ("locusts") are specially so. The mulberry flourishes, and sericulture is carried on. Cotton and maize are grown by the aid of irrigation during the hot summer. In addition, the mineral wealth is considerable, and asbestos, cupriferous pyrites (from which copper is obtained), and magnesite all are worked.

Over a third of the exports of the island consist of "locusts"—used chiefly in the manufacture of cattle food. Fruit, vegetables, and other agricultural produce also are exported, mainly to Egypt. The imports, chiefly supplied by Great Britain, are composed largely of manufactured goods.

The chief towns are *Nicosia*, the capital, situated on the inland plain; *Larnaka*, on the south coast, the chief commercial centre; and *Famagusta*, on the east coast, the best harbour.

CHAPTER VII

CANADA AND NEWFOUNDLAND

CANADA

POSITION, AREA, AND PHYSICAL FEATURES

THE Dominion of Canada, the largest member of the British Commonwealth of Nations, is a country of enormous distances. It includes the whole of the northern half of the great continent of North America, with the exception of the United States Territory of Alaska, in the north-west, and Labrador, a dependency of Newfoundland, in the north-east. From south to north it extends from the latitude of Rome to well within the Arctic Circle, and from east to west it covers 80° of longitude, from the Atlantic to the Pacific. The country is larger in area than either the United States or Australia, and nearly as large as the whole of Europe.

The division of the area of the Dominion into provinces and territories is shown by the following table :—

Provinces.	Land.	Water.	Total Land and Water.
	Sq. Miles.	Sq. Miles.	Sq. Miles.
Prince Edward Island	2,184	..	2,184
Nova Scotia	21,068	360	21,428
New Brunswick	27,911	74	27,985
Quebec ¹	690,865	15,969	706,834
Ontario	365,880	41,382	407,262
Manitoba	231,926	19,906	251,832
Saskatchewan	242,808	8,892	251,700
Alberta	252,925	2,360	255,285
British Columbia	353,416	2,439	355,855
Yukon	206,427	649	207,076
North-West Territories :			
Franklin	500,000	..	500,000
Keewatin	205,973	6,851	212,824
MacKenzie	501,953	27,447	529,400
Total	3,603,336	126,329	3,729,665

¹ It should be noted that the recent decision of the Judicial Committee of the Privy Council regarding Labrador, by which the area of that dependency of Newfoundland is greatly increased, has resulted in a corresponding diminution in the area of Quebec, and, therefore, of that of Canada. The fixing of the new boundary will, however, be a difficult and lengthy task, and the exact dimensions of the area involved will not be known for some years.

On the south the boundary between Canada and the United States is partly a natural one, but for the greater portion of its length it is purely artificial, fixed, before it was surveyed, without regard to physical features. Between the Pacific Ocean and the Lake of the Woods it follows the parallel of latitude 49° N. Thence to the north-eastern shore of Lake Superior it is marked by a chain of rivers and small lakes. The Great Lakes are crossed by a line equally dividing Lakes Superior, Huron, Erie, and Ontario, whence the boundary follows the River St. Lawrence as far north as latitude 45° N. From here the parallel of latitude is followed to the boundary of the State of Maine, in the United States, after which the boundary is an irregular one, enclosing Maine on three sides and finally reaching the Atlantic coast on the Bay of Fundy.

Physical Features.

Physically the country is composed of three distinct regions : (1) the Western Mountain Ranges ; (2) the Central Plains ; and (3) the Eastern Highlands.

THE WESTERN MOUNTAIN RANGES cover the Pacific Province of British Columbia and the Territory of the Yukon. They consist of a number of plateaus and numerous north-south chains of mountains and valleys, and cover a belt of country, varying from 500 to 800 miles in width, stretching inland from the west coast. On the eastern side are the famous Rocky Mountains, the main watershed of the country ; on the west are a number of coastal ranges to which various names are given in different parts, *e.g.*, the Cascade Range. Many great peaks over 10,000 feet in height are situated in this great mountain system.

The Pacific slopes of the ranges are covered with magnificent forests containing gigantic trees, while the valleys are fertile and very productive where there is an adequate rainfall or irrigation is possible. The rocks, which have been exposed and worn down during the course of the ages, contain much mineral wealth.

The rivers of this region are rapid and, except in their estuaries, of little use for navigation. They contain large quantities of salmon, however, and are of great value for irrigation. The chief are the Fraser, Skeena, Nass, and Stikine.

Owing to the mountainous character of the country the Pacific coast is deeply indented and provides many fine natural harbours. It contains innumerable deep and winding inlets, known as *fjords*, and in this respect resembles the coasts of Norway, Southern Chile, and south-western New Zealand.

The parallel north-south ranges and valleys of this region made communication with the interior extremely difficult, so much so that before the Canadian Pacific Railway was constructed, crossing the Rockies by the Kicking Horse Pass at a

height of a mile above sea-level and connecting the Pacific with the Atlantic, it was easier to reach the Pacific coast by the long voyage round Cape Horn.

Not only does this great mountainous belt form a physical barrier, but it also acts as a climatic barrier between the moist, equable west coast and the dry, extreme plains of the interior.

THE CENTRAL PLAINS stretch from the foothills of the Rocky Mountains away to the east as far as the Great Lakes and Hudson Bay, and, in the north, to the Arctic Ocean; on the south their continuity is unbroken and they extend from the extreme south to the extreme north of the continent. These great prairie plains descend from a height of some 3,000 feet in the west at the foot of the Rockies, to about 600 feet, in the east, round Hudson Bay, by three great steps or levels.

The mountainous barrier cuts the lowlands off from the abundant rainfall of the west, and they form gently undulating grasslands, particularly suitable, on the two lower steps, where the rainfall is more plentiful, to large-scale agricultural operations. These are the great wheat-growing *prairies*, which are now among the world's greatest granaries. On the topmost level the rainfall is not favourable to agriculture, and pastoral industries have, hitherto, been of greatest importance. The two lower levels correspond roughly to the provinces of Saskatchewan and Manitoba, and the highest, to Alberta.

The lowlands are crossed by a number of sluggish rivers fed from the snows of the mountains.

THE EASTERN HIGHLANDS consist of the highlands lying north of the Great Lakes and the River St. Lawrence, known as the Laurentian Uplands, and the north-eastern portion of the great Appalachian mountain system. Forming part of the former are Ontario and Quebec, of the latter, the uplands of Nova Scotia and New Brunswick.

Most of this region is thickly forested, but none of the gigantic trees, so common in British Columbia, is found. Along the shores of the rivers and lakes, however, the soil is very fertile, and the forests have been cleared to make way for agriculture. The largest lowland area of the region is that bordering the River St. Lawrence and known as the St. Lawrence Lowlands.

The rocks of the highlands contain valuable mineral deposits which are being worked to an increasing extent every year. The rivers, with the exception of the St. Lawrence and the Ottawa, are of little use for navigation, but supply abundant water-power, which is harnessed and employed in industry.

The coast, though not comparable with the Pacific coast in this respect, contains many good harbours, of which Halifax and St. John are rendered specially important by the fact that they alone of the great east coast harbours remain ice-free and accessible during the winter. The great estuary of the St.

Lawrence, with the river and the Great Lakes, forms a great natural waterway into the interior of the country.

CLIMATE

The vast extent of Canada and the variety of the relief give rise to many differences in the climatic conditions experienced in different parts of the country. Although it covers a greater area than that of the United States, owing to its northern situation Canada will never be able to support as many people. The inhabited portion of the country, to-day, consists of a belt 200-300 miles wide, on the average, and about 3,000 miles long, lying along the United States boundary. To the north of this belt the climate, one of great extremes, and the absence of good means of transport have greatly retarded development.

Temperature.

Except in the coastal region of British Columbia, which has one of the best climates in the world, the winter is both long and severe, and the temperature falls below freezing-point for at least a month each year. While the western mountains shut off the interior from the moderating influence of the sea, there is no mountain barrier in the north to prevent the bitterly cold Arctic winds from sweeping over the country. Further, the general slope of the interior is from south to north.

Canada lies, for the most part, in the belt of westerly winds, and the mild winters of British Columbia are the result of their influence. Just as they bring to the shores of the British Isles the warm North Atlantic Drift, so they drive to the Pacific coast of Canada the North Pacific Drift, a warm drift current from the Kuro Siwo, the great warm current of the Pacific Ocean, which flows northward off the coast of China. British Columbia, therefore, enjoys, in the coastal region, the same mild climate as does north-western Europe. Behind the coastal ranges, however, the climate is similar to that of Central Europe, and east of the Rockies it becomes extremely continental in character. On the high plains at the foot of the mountains, however, the *chinook* winds exercise a modifying influence, greatly tempering the severity of the winters and enabling grazing to continue throughout the year.

Of the settled regions Manitoba experiences the most severe winter; farther to the east, in the neighbourhood of the Great Lakes, the temperature rises rapidly, and, excluding the west coast, the warmest part of Canada in winter is the Lake Peninsula of Ontario. This lies farthest south, and also is most subject to the moderating influence of the Great Lakes. From the Lakes eastward, the temperature again drops and the winters are severe, the St. Lawrence being frozen over and navigation usually

being suspended from November to April. Also, from the end of December to March, the Great Lakes themselves are frozen for a distance of about a mile from the shores, and, consequently, are both inaccessible from the ocean and useless for navigation during the winter.

The severity of the winter on the east coast is due mainly to the fact that the winds blow off-shore from the frozen interior of the continent; there is, however, also the effect of the cold Labrador Current, flowing past the St. Lawrence from Davis Strait, to be taken into consideration. It carries along great volumes of Arctic water and great masses of ice, and in summer, particularly, is its cooling effect evident. It is due to the meeting of the waters of the Gulf Stream with this cold current that fogs are so prevalent in the Gulf of St. Lawrence and off the coast of Newfoundland.

In summer British Columbia again affords a contrast to the interior, for the coastal region is then comparatively cool. At this time of the year the warmest part of Canada is the east of Alberta; from here towards the east coast the temperature again diminishes, and the cooling effect of the Great Lakes and of the Atlantic Ocean is apparent.

Rainfall.

By far the heaviest rainfall is experienced on the coast of British Columbia, in the west of Vancouver Island more than 100 inches falling in the year. (Fig. 23.) The windward sides of

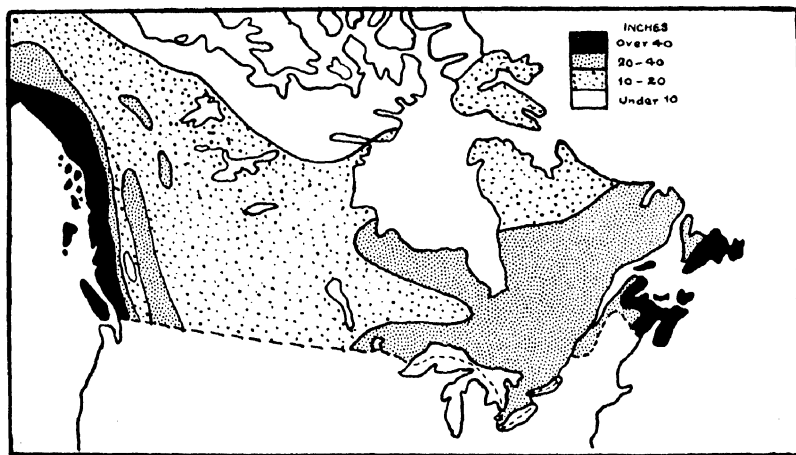


FIG. 23.—THE MEAN ANNUAL RAINFALL OF BRITISH NORTH AMERICA.

the coastal ranges have an abundant rainfall at all seasons. The close relationship of rainfall to relief is thus plainly indicated. In the interior of British Columbia, however, in many

parts where the rain is not "trapped" by relief, the rainfall is low, and irrigation is required for agriculture. On the Rockies the rainfall is fairly abundant in spite of their distance from the sea, but eastward, on the great plains, the amount of the precipitation is small and decreases gradually as the interior is approached, as little as 10 inches falling in south Saskatchewan. From here to the east coast the rainfall gradually increases again, until, on the Atlantic coast and east of the Great Lakes, it reaches between 40 and 60 inches.

In most of the east of Canada, as well as in the west, there is a considerable precipitation during the winter months. At this period everywhere but in coastal British Columbia it takes the form of snow. In southern Saskatchewan the mean annual snowfall is about $2\frac{1}{2}$ feet (equivalent to about $2\frac{1}{2}$ inches of rain), and the amount increases rapidly towards the east. On the east shores of the Lakes it is specially heavy, 17 feet in some places, and in most parts of the Gulf of St. Lawrence region it exceeds 8 feet.

The Chief Natural Regions of Canada.

The physical features and climate of the country naturally combine in their effect on the distribution of vegetation and animals, and Canada may be classified in broad natural regions as follows :—

(1) **THE TUNDRAS** lie chiefly within the Arctic Circle. Their nature has already been described in considering the broad natural regions of the world. (See Chapter II.)

(2) **THE CONIFEROUS FOREST REGION** lies immediately south of the Tundras and stretches from the Atlantic to the Pacific. In this region the winters are long and bitter and the summers short. The precipitation is small, and broad-leaved trees are, therefore, relatively rare. Conifers, such as pines, firs, hemlocks, spruces, and larches, predominate, but one broad-leaved tree, the birch, is present in considerable numbers.

These coniferous forests are the natural home of many small fur-bearing animals, such as beavers, hares, minks, martens, skunks, squirrels, and musk rats, and also of numerous larger animals, such as moose, caribou, bears, wolves, and foxes.

(3) **THE PACIFIC FOREST REGION** comprises the forests of British Columbia, which extend from the coast inland to the Rockies. The mild and wet climate is particularly favourable to tree growth, and such enormous trees as the Douglas pine, the Sitka spruce, the hemlock, and the western red cedar grow in large numbers on the coastal plains; in the interior yellow pine, larch, and fir predominate. Of the many animals found in the forests of this region may be mentioned the bear, antelope, and mountain sheep.

(4) THE ATLANTIC FOREST REGION covers much of Quebec south of the coniferous forests, Ontario, and New Brunswick. Mixed forests of coniferous and deciduous trees are found here, the former predominating in the north, where pines, firs, spruces, and larches are most numerous, and the latter in the south, where oaks, elms, maples, poplars, and other hardwoods predominate. Fur-bearing animals, such as the beaver and squirrel, abound.

In both the Atlantic and the Pacific forest regions much of the timber has been cut down in connection with the lumbering industry, and, in the south, a great deal of the land has been cleared for agriculture.

(5) THE "TEMPERATE" GRASSLANDS stretch, south of the forest region, from the Rockies to the Great Lakes. Generally, the climate is one of hot summers, bitterly cold winters, and little precipitation. Here trees, though not entirely absent, are relatively scarce, and the great grassy plains at one time formed the home of great herds of bison. Only in the extreme north of the region are they now found, and vast expanses of wheat wave on ground which once resounded to the thunder of their hoofs.

INDUSTRIES AND COMMERCE

Canada is a country of untold natural wealth, and possesses resources of enormous value: her soil is of great fertility; her forests are of vast extent, rich in splendid timber and abounding with fur-bearing animals; valuable mineral deposits are found within her rocks; her inland waters and the oceans washing her shores teem with fish; and her rivers provide abundant water-power.

Agriculture.

Canada is first and foremost an agricultural country, and within the last quarter of a century she has become one of the greatest granaries of the world, though as yet only about one-fifth of her arable land is under cultivation. The great significance of agriculture to her is emphasised in the following quotation from a booklet¹ prepared by the Natural Resources Intelligence Service of the Department of the Interior:—

"Agriculture is the economic heart of Canada. Among the natural resources of the Dominion arable lands stand unrivalled. It is difficult to appraise adequately the degree to which they are responsible for sustaining the industrial and commercial life of Canada regarded as a whole. Lumbering, mining, and fishing in the sphere of primary production, the secondary industries of manufacture, the essential services rendered by transportation systems and by purely commercial enterprise, all contribute materially to national income and development. But agriculture is the pre-eminent basis

¹ *Canada: Natural Resources and Commerce*, 1923.

activity by which Canada's economic stature and character have been determined. It forms the chief direct means of livelihood, and, moreover, the rural population of the Dominion—constituting both a broad consuming market and a large reservoir of raw materials—is an indirect but vital factor in fostering extensive communities engaged in other phases of primary industry as well as in manufacture and commerce."

WHEAT occupies about two-fifths of the total area under crops, and over 95 per cent. of this acreage lies in the great prairie provinces, *Saskatchewan* leading with 56 per cent., *Alberta* following with 25 per cent., and *Manitoba* with 14 per cent. By far the greater proportion of the wheat is sown in the spring and harvested in the autumn ("spring wheat"), but where the winters are not so severe, small areas are sown in the autumn, the wheat being harvested the following summer ("winter wheat"). Such areas are found in Ontario, Alberta, and British Columbia, but the acreage of winter wheat forms less than 4 per cent. of the total wheat area.

The winter wheat areas have the greatest yield per acre, as is indicated by the following figures, showing the average yields of the years 1919-23—British Columbia, 22·8 bushels per acre; Ontario, 21·5; Saskatchewan, 15·4; Alberta, 15·1; and Manitoba, 14·1.

The conditions favouring the cultivation of wheat on such an enormous scale in the prairie provinces may be stated, briefly, as follows :—

(1) The rolling, open grasslands are particularly favourable to large-scale agricultural operations by the aid of machinery.

(2) The soil is exceptionally fertile throughout, but is specially so in the Red River region of Manitoba, south of Lake Winnipeg.

(3) The climate is favourable, as, during the winter, the surface of the ground becomes broken up and exposed to the air, and the hot, bright summer, with little rain, ripens off the grain to perfection.

(4) Railway construction is easy, and the existence of the railways renders possible large-scale production of grain.

After the wheat has been reaped and threshed it is carried to the nearest "elevator." The elevators are great storage warehouses, and, in the country, now number about 4,000, having a total capacity of some 134 million bushels. In the prairie provinces they are conspicuous objects at nearly every railway station. Besides these there are many terminal elevators at the ports of shipment.

Practically all the wheat exported is sent to one of two great distributing centres—the twin-ports of Fort William and Port Arthur, on Lake Superior, in the east, and Vancouver in the west. From the former wheat is sent to the seaboard by many routes (Fig. 24), and there are no less than eight different ports of shipment for Canadian wheat on the Atlantic coast, viz.,

Montreal, St. John, and Halifax in Canada, and Portland, Boston, New York, Philadelphia, and Baltimore in the United States. More than half the wheat exported overseas is shipped from American ports, although it is thereby conveyed over longer distances than if it were sent from Canadian ports. The Canadian wheat-grower is convinced, however, that it would be to his advantage and to that of the country at large if his produce were shipped entirely from Canadian ports. "This conviction, almost universally shared by the public, lies at the basis of the continuous agitation for improving the means of access to the sea

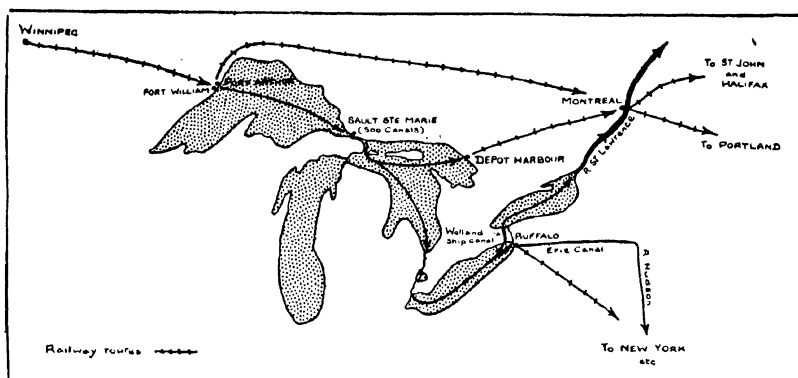


FIG. 24.—DIAGRAM SHOWING THE DIFFERENT ROUTES BY WHICH CANADIAN GRAIN REACHES THE ATLANTIC PORTS OF SHIPMENT.

which has expressed itself notably in schemes for deepening the St. Lawrence, for the construction of a ship-canal from the Georgian Bay to Montreal, for developing ports on the Pacific Coast, and for opening the route through the Hudson Bay."¹

These matters are dealt with later under "Communications", but it must be borne in mind that the shortest route is not necessarily the cheapest, and will not infallibly attract all the traffic. If it were, Canadian wheat would never reach Britain *via* Buffalo, Philadelphia, and Newport, for this route is probably a thousand miles longer than that *via* Montreal, and several hundred miles longer than that *via* New York even. Distance is, therefore, only one of the factors in the transportation problem—very often the one of least importance. The dominant factor is freightage.

At one time the production of wheat was practically the sole industry of the prairie provinces, but this is not so to-day. A failure of the wheat crop often meant ruin to the farmers, and a system of mixed, or balanced, farming has been adopted. In addition to wheat large quantities of other cereals and vegetables are produced and pastoral industries also are important throughout the prairies.

¹ *Economic Resources of Canada*, by Sir Henry Rew.

OATS are much more generally distributed than wheat, and throughout eastern Canada are more important. The two chief oat-growing provinces, however, are *Saskatchewan*, with over one-third of the total acreage, and *Alberta*, with about one-sixth. The total area under oats is only about two-thirds of that under wheat, but the yield per acre is double, and the crop is consequently considerably larger in quantity. Oats are grown chiefly for feeding horses and as a winter food for cattle, but there is also a considerable industry for the production of breakfast foods.

BARLEY is much less important than either wheat or oats. It is grown chiefly in Manitoba (50 per cent. of the total acreage), *Saskatchewan*, *Alberta*, and *Ontario*.

MAIZE is grown only to a very small extent, and as a grain crop is practically confined to southern *Ontario*, the only region where the summers are sufficiently hot and moist to ripen the grain. Elsewhere it is grown only for fodder.

POTATOES AND TURNIPS are grown throughout the Dominion, potatoes chiefly as food for man, the area under this crop varying in each province according to the size of the population. Turnips and mangolds, on the other hand, are grown chiefly as cattle food, and the acreage is much smaller, the chief province being *Ontario*.

SUGAR BEET is grown chiefly in *Ontario*. After the war its cultivation was stimulated by the payment of bounties by the provincial governments; but since 1920, when the acreage reached its greatest extent, the beet-growing area has been considerably reduced.

TOBACCO is grown largely in *Ontario* and *Quebec*. The total crop is in the neighbourhood of 33 million pounds. Most of the tobacco is consumed in Canada, the remainder being manufactured into cigarettes and exported to the United States.

FLAX is grown for its *fibre* chiefly in *Ontario*, but *Quebec* also grows the crop to a small extent. The total area, however, is small. In *Saskatchewan* it is grown chiefly for its *seed* (linseed).

FRUIT. Fruit-growing is an important industry, particularly in the Lake Peninsula of *Ontario*, well named "The Garden of Canada", where the climate is particularly favourable. Not only does the region lie in the same latitude as northern Spain and the south of France, but it is also subject to the tempering influence of the Great Lakes, which prolongs the autumn and retards the coming of spring until all likelihood of the crops being injured by frost has gone. The winters are cold and snowy, as elsewhere throughout the interior and east of the country, but they have a beneficial influence in destroying insect pests.

Of the total area covered by orchards *Ontario* has 61 per

cent.; *Nova Scotia*, 13 per cent.; *British Columbia*, 12 per cent.; and *Quebec*, 10 per cent. *Apples* form by far the most important crop, followed in order by *peaches*, *plums*, *pears*, and *cherries*. In addition to these, however, large quantities of *grapes*, *nectarines*, and *small fruit*, such as strawberries and raspberries, are grown, chiefly in Ontario. Where the summer climate is not so favourable, as in *Quebec*, *Nova Scotia*, and also to a less extent in *New Brunswick* and *Prince Edward Island*, harder fruits predominate and apples are grown on a large scale. The *Annapolis Valley* and the *Minas Basin*, in *Nova Scotia*, are particularly important apple-growing districts.

In *British Columbia* many of the sheltered valleys, notably the *Okanagan Valley*, are particularly favourable to the cultivation of apples, pears, plums, cherries, peaches, and grapes, and fruit-farming, by the aid of irrigation where necessary, is becoming increasingly important. Much of the fruit is canned for export at *New Westminster*.

The following figures, giving the proportion of the total crop of each of the chief fruits grown in the Dominion produced in Ontario, *Nova Scotia*, and *British Columbia*, show not only the preponderance of orchards in these provinces but also the effect of the local physical conditions on the fruits grown.

	Apples.	Peaches.	Pears.	Plums.	Cherries.
	%	%	%	%	%
Ontario	55.0	91.5	73.0	66.4	71.1
Nova Scotia	25.7	..	2.2	1.1	1.0
British Columbia	9.8	8.4	24.7	25.0	21.5
Percentage of Total Crop of the Dominion	90.5	99.9	99.9	92.5	93.6

Pastoral Industries.

In a country where agriculture is of such tremendous importance it is natural that pastoral industries also should be among the foremost occupations.

Stock-raising is particularly important in *Alberta*, where the climate in winter is sufficiently mild for the cattle to remain in the open. Here, until the introduction of irrigation and the method of "dry farming", ranching was the only industry. Large herds of cattle are kept in *Sackatchewan* also. In both provinces there is an ample supply of good natural grazing, many thousands of acres being covered with fine nutritive grass, which is turned into hay where it grows by the heat of late summer and early autumn, and thus provides an adequate food supply all the year round.

In *Ontario*, *Quebec*, and the eastern, or Maritime, provinces, cattle are reared in large numbers, mainly for *dairy farming*, and cheese and butter are important exports from this region. The pastures here are much richer than those of the prairies, but the cold winter with its deep falls of snow, compels the farmers to keep the cattle in sheds from about November to April.

Horses are reared in large numbers in the great ranching provinces of *Alberta* and *Saskatchewan*, and also in *Ontario*. There seems, however, to be a tendency towards reduction of the numbers reared, probably due to the increasing use of motor transport and to the mechanisation of agriculture.

Sheep are reared in comparatively small numbers, mainly in *Ontario* and *Quebec*, where the wool is used in the local textile industries.

Pigs are kept in large numbers in *Ontario*, though the numbers reared in *Alberta* and *Saskatchewan* have increased in recent years. The curing of bacon is important in *Ontario*, and considerable quantities are exported every year.

Forestry.

Among the basic resources of Canada forests stand second, and they have proved of immense importance as a factor in the rise of Canadian commerce. Great areas of the Dominion remain to be surveyed, and the actual extent of the commercially valuable forests cannot, therefore, be stated accurately. It is undoubtedly enormous, and it has recently been estimated that some 150,000,000 acres bear saw timber of merchantable size. In addition to this about 450,000,000 acres bear young stands or timber suitable for pulpwood, fuel, etc.

More than 80 per cent. of the forests consists of coniferous trees, and lumber and pulpwood are, therefore, the chief forest products. There are, however, many minor products of the industry, used both for home consumption and for export.

The chief provinces concerned in forestry are *Quebec*, *Ontario*, *British Columbia*, and *New Brunswick*.

Lumbering is carried on mainly in the winter, when the marshes have been frozen and the snow packs into hard, firm roads along which the logs can easily be drawn to the nearest river. With the spring thaw the rivers become flooded and carry the logs, made into great timber rafts, down to the saw-mills—usually situated where abundant water-power is available from adjacent falls and where facilities exist for the transport of the sawn timber. The busiest lumbering rivers of the whole Dominion are the *Ottawa*, in *Ontario*, and the *St. John*, in *New Brunswick*, the towns of *Ottawa* and *St. John* being great saw-milling and timber and wooden-ware manufacturing centres.

The export of wood, wood products, and paper has made a

great advance in the last ten years or so, and Canada is to-day the largest producer of wood-pulp and paper in the world.

Another important product of the forests is *furs*. Several centuries of constant exploitation have failed to undermine the supply, and Canada to-day contributes larger quantities than ever. The prolific yield and the importance of the fur trade is indicated by the fact that every year between four and five million pelts are taken. Every province has a substantial share in the industry, and in the North-West Territories exists an enormous reserve, at present scarcely touched, which, with careful exploitation, should yield a valuable annual catch in perpetuity.

Quebec is the foremost province in forest production, both from the point of view of quantity of material and value of products. It is first in the production of firewood, pulpwood, fencing material, square timber for export, and other products, while it produces extensively saw logs, railway ties, poles, and hardwood for distillation. Ontario is a close second.

A curious feature of the lumber industry is the labour supply. Canada is markedly short of man power, but, fortunately, her greatest labour-absorbing industries are so arranged that the *same labour supply* is used in both. It is in spring and summer that wheat-growing and cattle-ranching claim the services of the labourers, but as soon as winter comes the majority of them pack up their property and trek north to the forest regions, where they remain throughout the winter until spring calls them south to the crops and cattle again.

Fisheries.

Canada follows Great Britain and the United States as the third greatest fishing country. She possesses fisheries of exceptional value not only on the Atlantic and the Pacific coasts but also in her great fresh-water areas, and the huge inland sea of Hudson Bay, still almost untouched, may be regarded as a rich reserve.

The fisheries of the *Atlantic* coast fall into two divisions—the deep-sea and the coastal fisheries. Of these the coastal fishery is by far the more important, and it employs six times as many men as the deep-sea fishery. Along the whole coast-line are innumerable well-sheltered inlets which afford splendid facilities for carrying on fishing operations, and the small boats used rarely proceed farther than ten miles out to sea. In addition, various fishing appliances are operated from the shore. The deep-sea fishery extends over the many comparatively shallow stretches of water covering the “banks” lying between the outer limit of the inshore fishery and the deep waters of the Atlantic. These range from the Grand Bank of Newfoundland to Brown’s Bank, west of Nova Scotia, and the many banks of the Gulf of St. Lawrence.

Of all the branches of the Atlantic fisheries the *cod* fishery is the most important, but *haddock*, *hake*, *halibut*, *herring*, *mackerel*, "*sardines*," *flounders*, *pollock*, and *salmon* all abound and are caught in large quantities. Also, just off the shores of the Atlantic provinces are situated the richest and most extensive *lobster* fishing grounds in the world. They yield such enormous supplies every year that an important lobster-canning industry has grown up, and over five hundred canneries are now in operation in this branch of the Atlantic industry.

The fisheries of British Columbia, on the *Pacific* coast, also are extremely rich. In value they contribute about 40 per cent. of the total produce of the Canadian fisheries. By far the most important fishery of this region is the *salmon* fishery, yielding over three-quarters, by value, of the total fish caught. Every spring enormous numbers of salmon ascend the rivers and coastal inlets from the sea to spawn. At this time of the year they are taken in trap-nets, gill-nets, etc., in great quantities throughout the region from the Fraser in the south to the Nass in the north. In each of such rivers as the Fraser and the Skeena and in the Rivers Inlet and its approaches, more than 1,000 boats operate gill-nets during the open season each year. Also, large numbers of salmon are taken in the open sea by means of trolls, sometimes as far as thirty miles out to sea. The greater portion of the salmon catch is canned for export, in an average year the number of one-pound tins so packed exceeding fifty millions.

In addition to salmon the *halibut* fishery of the province is of great importance. The fish are caught mainly off the west coast of Vancouver Island and the Queen Charlotte Islands, in Hecate Strait and Dixon Entrance, operations being carried on chiefly from Vancouver and Prince Rupert. *Herrings*, also, are important, being extremely abundant throughout the British Columbian waters, but especially in the Barkley Sound region, on the west coast of Vancouver Island, and in the Nanaimo district, on its east coast.

The fisheries of the *Great Lakes* and the lakes of Alberta, Saskatchewan, and Manitoba, all are prolific in yield, and give employment to several thousand fishermen. The principal fish caught are fresh-water *herring*, *perch*, *pike*, *pickerel*, *sturgeon*, *trout*, *carp*, and *white fish*.

In the order of importance of the value of their fishery products the provinces are as follows: British Columbia, Nova Scotia, New Brunswick, Ontario, Quebec, Prince Edward Island, Manitoba, Saskatchewan, and Alberta. Reckoned by *value*, salmon takes first place among the fish caught, followed, in order, by lobster, cod, and halibut. If, however, *quantity* be the deciding factor in determining the order of importance, cod comes first, followed by herring, salmon, lobster, and halibut.

Minerals.

The greater part of Canada has still to be systematically prospected, and the fact that the known mineral resources are both diversified and extensive holds out much promise for the future ; more so as much of the unprospected area is geologically similar to some of the districts in which mining is now an important industry. Even with such vast unexplored resources, however, Canada's mineral wealth is of world importance, for she stands first among the countries of the world in the production of *nickel*, *asbestos*, and *cobalt* ; third in *gold* and *silver* ; and ninth in *coal*. She is generally recognised as being one of the greatest of the world's known mineral reserves, and Ontario, with the world's greatest silver-field, nickel-field, and gold-mine, is a veritable treasure store.

COAL.—The coal-fields of Canada, concentrated in the extreme eastern and western provinces, are of enormous extent and as yet have been worked only where the fields have bordered the coast or where railway lines happen to cross them. As with the mineral resources generally, the development of the coal resources is dependent on the extension of transport facilities.

It is noteworthy that Ontario and Quebec, both with comparatively dense populations, industrial possibilities, and wealth of other minerals, have no coal deposits.

The coal is mined in four regions, *viz.*, (1) Atlantic Coast ; (2) Alberta and Saskatchewan ; (3) Rocky Mountains ; and (4) Pacific Coast.

(1) The most important fields here are those of *Nova Scotia*, which produce about 40 per cent. of the total Canadian output, the coal also being of excellent quality. The chief mines are situated round Sydney, on Cape Breton Island, and along the northern shore of the mainland. As this field is able to obtain plentiful supplies of iron-ore from the rich deposits of Newfoundland, there is an important iron industry at Sydney. Large quantities of coal are exported from Sydney to the St. Lawrence ports, to Newfoundland, and to the New England States of America, but, above Montreal, the whole of the coal used in the St. Lawrence basin is obtained from the United States by water transport.

(2) The western prairie provinces of Alberta and Saskatchewan have large deposits of lignite and bituminous coal. *Alberta*, particularly, is rich in coal, standing first among the provinces in its resources. In Saskatchewan the production is entirely used for local requirements, and this has been so in Alberta also, until recent years. The industry of the province is now rapidly expanding, however, and is beginning to supply other provinces. In Alberta the chief coal-producing district is situated round Edmonton, but near Banff, at the eastern approach to the Kicking Horse Pass, there is a small field producing anthracite.

(3) In the Rockies there is an important coal-field at Fermie, on the British Columbia side of the Crow's Nest Pass, and in the Kootenay district, farther west, important deposits are worked. Both these fields were opened up as a result of the construction of the Canadian Pacific Railway. Anthracite, also on that railway, has derived its name from the deposits of anthracite coal which are found there.

(4) Besides these mountain fields, British Columbia has important coal-fields on Vancouver Island, the chief mining region being centred round Nanaimo, on the east coast. As this is one of the very few coal-producing districts on the Pacific coast, there is a considerable export to the western United States, the amount thus exported depending on the price of Californian oil.

On Queen Charlotte's Islands valuable deposits of anthracite occur.

SILVER.—Large quantities of silver are mined in the *Cobalt* district of Ontario, which produces almost the entire Canadian output. Small quantities, however, are obtained from near *Nelson* and *Rosslund* in British Columbia.

GOLD.—Supplies of gold are obtained chiefly from Ontario, the great development in the *Porcupine* district during the last few years having placed Canada third in the world's list of gold producers and in a fair way to succeed the United States as the second. The Hollinger Mine of this district is now the greatest gold-mine in the world.

Considerable quantities of gold are obtained from the *Rosslund* and *Nelson* districts of British Columbia, and from the *Klondike* district of the Yukon. It is in the production of these two metals, silver and gold, that the greatest mining expansion of Canada has occurred in recent years.

NICKEL.—In the production of nickel Ontario again holds the lead. The province contains the greatest deposits of this metal in the world, the mines of the *Sudbury* district supplying more than 80 per cent. of the world's output.

COPPER.—Large quantities of copper are mined in the *Sudbury* district, but British Columbia is the premier copper-producing province of the Dominion, the two largest copper-mines of the British Empire being located in the Coast Range—the Hidden Creek Mine of *Anyox* and the Britannia Mine on Howe Sound, twenty miles north of Vancouver. Also, near Tulameen, between the Fraser River and Lake Okanagan, there is a large deposit of copper, known as the Copper Mountain Mine, which is producing on a large scale. The famous *Rosslund* mines have yielded immense quantities but are now almost depleted.

LEAD and ZINC.—These are produced in the largest quantities in British Columbia, and the Sullivan Mine at *Kimberley*, in the

Kootenay region, is one of the largest lead-zinc mines in the world. This district produces large and increasing quantities of these metals; almost the entire zinc production of the Dominion and by far the greater part of the production of lead, the only other lead-producing region of importance being round *Galetta*, in Ontario.

IRON ORE.—Deposits of iron ore are widely distributed throughout the Dominion, but only in Ontario, chiefly in the Michipicoten district on the northern shore of Lake Superior, and in British Columbia in Texada Island, in the south of Vancouver Island, near Victoria, and, in the north, near Quatsino Sound, are operations conducted on a large scale.

OTHER MINERALS.—These include *asbestos*, mined in large quantities in Quebec, which province possesses the most valuable deposits in the world; *corundum*, also found principally in Quebec; *cobalt*, from the Cobalt region of Ontario, the chief source of the world's supply; *natural gas* and small quantities of *petroleum*, from Ontario, Alberta, and New Brunswick; and *clays* and *building stones*, from many parts of the country.

Water Power.

Like the mineral resources of Canada her resources in water-power are as yet but imperfectly known. They are, however, abundant and well distributed throughout the Dominion, except in the south-western portion of the prairies in Alberta and Saskatchewan. A large amount of water-power is available in the territory centring on the Great Lakes, and it is natural that the greatest development of hydro-electric power should have taken place in this coalless area, the "acute fuel zone," as it is called.

The development has been rapid during the past quarter of a century, and, even though only about 7 per cent. of the estimated possible turbine installation has been used as yet, Canada to-day possesses about 3,000,000 operating horse-power and over 21,000 miles of transmission and distribution systems. Hydro-electric generation has thus come to be one of Canada's basic industries.

Manufactures.

From a purely raw material-producing region the Dominion has rapidly developed into an important manufacturing country, her production of manufactures having increased from £44,500,000 in 1870 to £589,600,000 in 1925, and she is now the second manufacturing country of the British Empire. Several factors have contributed to this great advance. The scientific development of the water-power resources has enabled manufacturers to obtain cheap and plentiful power at those points most suitable

for carrying on manufacturing industries ; the enterprise of the Canadian banks has been of enormous assistance in providing capital ; the great development of the railways has facilitated the exploitation of the country's great natural resources and has made it possible for raw materials to be transported to the sources of power ; the rapid development of the Dominion has provided a large home-market for manufactured goods of all kinds ; and, finally, the effect of the Great War, in cutting off the supply of European manufactures, led to rapid growth in Canadian industries, and resulted in the building up of an export trade in manufactured articles.

It has become obvious that Canada has marked advantages as a field for manufacturing enterprise and, as a consequence, American and British capital has been attracted in large amounts. In the case of the United States this interest has not stopped at the purchase of stocks and bonds of Canadian-owned and managed enterprises, but has led to the "emigration" of many American industries to Canada. To-day the manufacturers of the United States have hundreds of branch factories in the Dominion, and the inscription "Made in Canada" by no means invariably indicates that the article so marked is produced by Canadian enterprise.

Canada's manufactures are situated chiefly in Ontario and Quebec, where there are a large number of manufacturing towns, particularly in the Lake Peninsula and southern Quebec. This is not surprising in view of the fact that these two provinces contain about 60 per cent. of the population of the Dominion and thus provide an abundant labour supply and a ready market for the products of the industries, besides being plentifully endowed with water-power. Even in the prairie provinces, however, the most thinly populated of the provinces, manufacturing industries are now well advanced.

The preparation of *food products* naturally plays a very important part in Canadian manufacturing. The slaughtering and packing industries and the flour-milling industry are all of great economic value. The fine quality of the Canadian wheat and the abundant hydro-electric power available have placed the Dominion in the foremost rank of the world's milling centres, and there are in Canada over 1,300 flour-mills. There are many other important industries connected with food : innumerable dairies, creameries, cheese factories, canneries (both for fish and fruit), sugar refineries, bakeries, and plants for the preparation of milk products, and Canada has become one of the greatest food-product manufacturing countries in the world.

Closely approaching the food-producing industries in importance are the manufactures of *wood and paper products*, and Canada has become the largest producer and exporter of newsprint in the world. The *chemical* manufacturing industries, too, are of great importance, such products as paints, varnishes, soaps,

explosives, matches, fertilisers, and wood distillates being produced in large quantities. *Leather* industries, also, are active. There are many large tanneries and several large boot and shoe factories, and works specialising in the manufacture of harness and saddlery. Another minor group of important industries includes those engaged in the manufacture of *glass, cement, abrasives, and clay and stone products*. Yet another group is engaged in the manufacture of *agricultural machinery* of all kinds.

Canada has lately become an important manufacturer of *motor-cars*. Stimulated by the presence of the Ford Motor Company, the industry is steadily expanding, and the products of Canadian motor works are now exported to all parts of the world. Those industries manufacturing *electrical equipment* and supplies also are steadily expanding. Other important industries are the manufacture of *rubber goods*, in which Canada now stands fourth, and of *textiles*.

Commerce.

Canada's external trade has made great strides during the present century, and in respect of exports per capita she now takes second place among the countries of the world, yielding priority of position only to New Zealand.

The *exports* still consist very largely of foodstuffs and raw materials, the produce of her farms, forests, fisheries, and mines, but manufactured goods of all kinds, from cheese and condensed milk to paper and motor-cars, are forming an increasingly large proportion. Canada's best customers are the United States, which takes almost half the total exports, and the United Kingdom, with over a third.

The *imports* are chiefly manufactured goods, iron and steel goods being easily the most important, followed by textiles. Raw materials and foodstuffs of tropical and sub-tropical origin also are important items. The United States is by far the largest exporter to Canada, and although Canada ranks first among the overseas Dominions in the total value of imports, she takes a smaller percentage of British goods than any other principal unit of the Empire.

POPULATION AND TOWNS

At the 1921 census the population of Canada was returned as over 8½ millions, of which about half was settled in towns. The population is very unevenly distributed, as is to be expected from the fact that while some parts have only recently been opened up, others have been settled for over three centuries, and it is easy to understand why the density tends to decrease from east to west.

The Canadian nation is made up of many racial elements, and, although the British element predominates, the French forms a large percentage. In Quebec the British form but a small minority, most of the people being of French descent, still using the French language, and maintaining their French characteristics, and the proportion of the total population of the Dominion which is of French origin is over a quarter. Of the Red Indians but few remain, and their numbers diminish year by year.

For a land of such vast natural resources and enormous possibilities of development, Canada is remarkably underpopulated, her total population in 1921 showing a density of only 3.80 persons to the square mile. Consequently, the Canadian government, with a view to the development of the material resources of the country, has at all times been ready to welcome immigrants, and the cheap land and state bounties offered to workers on the land have attracted a steady flow of foreigners. A large proportion of the immigrants to the prairie provinces are from the United States, but conditions in Canada are particularly attractive to those who cannot find work in Great Britain. The British Isles accounted for 37,030, and the United States for 18,778, out of a total of 96,064 immigrants in the year 1925-26, the remainder coming from the continent of Europe and Asia. The population of the towns, too, is increasing, as in the case of Montreal and Winnipeg.

Chief Towns.

The chief towns of Canada are dealt with below according to the provinces in which they are situated.

NOVA SCOTIA. (Population 523,837.)

Halifax is the capital and largest town of Nova Scotia. It has a very fine harbour, easily accessible at all seasons of the year, and is an important coaling and oiling station, and the headquarters of the Atlantic Division of the Royal Canadian Navy. Commercially, it is a trading rather than a manufacturing town, but it has both sugar refineries and cotton factories. It is the terminus of the old Intercolonial Railway.

Sydney, on Cape Breton Island, besides being an important coal-mining and iron and steel manufacturing centre, is a port of considerable importance.

PRINCE EDWARD ISLAND. (Population 88,615.)

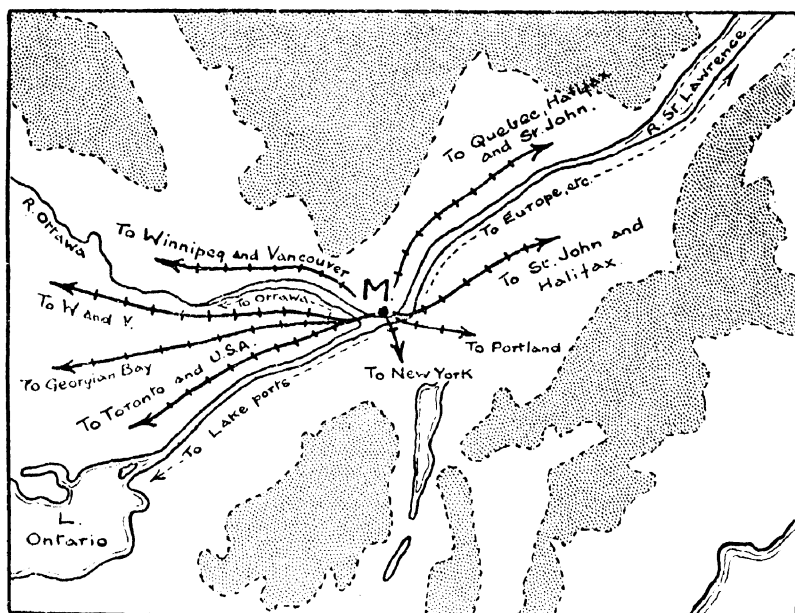
Charlottetown, the capital, situated on the south coast, is the port and chief town. It is of comparatively small importance.

NEW BRUNSWICK. (Population 387,876.)

Fredericton, the capital, is situated about 90 miles up the St. John River. It is an important centre of the lumber trade.

St. John, situated on a fine harbour on the Bay of Fundy, is

the largest town and chief port of the province. Like Halifax, it is never closed by ice and is accessible at all seasons of the year. Both these ports are, therefore, of special value during the winter months, when the ports of the St. Lawrence are closed. Their foreign commerce is consequently very great, that of St. John being somewhat the larger. St. John is the Atlantic terminus of the Canadian Pacific Railway, and is the winter



Land over 1,000 feet above sea level

FIG. 25.—THE POSITION OF MONTREAL.

port for the liners run by the Company. The town has saw-mills, pulp-mills, and textile factories.

QUEBEC. (Population 2,361,199.)

Quebec, the capital, is one of the most important industrial centres of the Dominion. It is situated on the north-west bank of the St. Lawrence estuary, near its head, about 300 miles from the Gulf of St. Lawrence and 180 miles below Montreal. The port has a very fine, deep harbour, but, in common with the other St. Lawrence ports, is open to navigation only from May to the beginning of November. The town has varied industries, the power for which is provided by the adjacent Montmorency Falls. The chief manufactures are iron and steel goods, textiles, leather, boots and shoes, paper, and tobacco.

Montreal is by far the largest town of the Dominion, the

chief commercial centre, and, in spite of the closing of the St. Lawrence in winter, the principal port. Situated where an island facilitated the bridging of the St. Lawrence, it has a magnificent position commanding many important routes which converge there. (Fig. 25.) The deepening of the channel of the river has made it the head of ocean navigation for large vessels; it commands the traffic to and from the Great Lakes, most of the cargoes having to be transhipped there; it commands the routes of the Ottawa valley, both rail and river; and the routes from New York and other American Atlantic ports converge on it through the valley of the Richelieu. The city is therefore naturally a great railway junction, and several important lines, notably the Canadian Pacific and the old Grand Trunk, have made it their headquarters. It is also the headquarters of several important trans-Atlantic shipping companies.

The Lachine Rapids, above the town, and the Shawinigan Falls, on the St. Maurice River, provide ample supplies of cheap power, and the town is a great manufacturing centre, its industries employing many thousands of men. The manufacture of railway plant and sugar refining are the chief industries, but the manufacture of leather and leather goods, textiles, india-rubber, tobacco, and malt liquors also is important. It may be mentioned here that at the Shawinigan Falls there is an important electro-chemical industry and great pulp- and paper-mills, while *La Tuque* and *Grand Mère*, also on the St. Maurice River, are rising industrial centres.

ONTARIO. (Population 2,933,662.)

Toronto, the capital of the province, is the second largest city of Canada. Situated on the northern shore of Lake Ontario, it has a fine harbour and is an important Lake port, carrying on a great commerce in lumber, grain, fruit, cattle, and coal. In addition it is an important manufacturing centre, and has saw-mills, flour-mills, paper-mills, breweries, distilleries, foundries, and furniture factories.

London is situated at the junction of the two branches of the River Thames, about 120 miles south-west of Toronto. It is an important manufacturing town and has petroleum refineries, foundries, mills, and tanneries.

Hamilton, situated at the western extremity of Lake Ontario, is well named "The Birmingham of Canada," the production of iron and steel goods being specially important there. Other manufactures of the town include textiles, boots and shoes, and glass ware.

Kingston, at the eastern end of Lake Ontario, is an important Lake port controlling the traffic passing through the Rideau Canal. It is also a busy manufacturing centre, and has ship-yards and manufactories for locomotives, machinery, boots and shoes, and agricultural implements.

Ottawa, the seat of the Dominion Government, is situated on the River Ottawa, about 100 miles west of Montreal. The famous Chaudière Falls supply plentiful power for the great saw-mills, paper-mills, flour-mills and numerous factories of the city.

Sudbury, situated to the north of Lake Huron, is the centre of a rich mining region producing nickel and copper in large quantities.

Sault Ste. Marie, at the eastern end of Lake Superior, on the "Soo" Canal, is an important industrial centre, having great pulp-mills and iron and steel works, power being derived from the rapids of the St. Mary's River.

Port Arthur and *Fort William*, situated on the north-western shore of Lake Superior, are great grain ports. Shipbuilding and iron-smelting are important industries.

MANITOBA. (Population 610,118.)

Winnipeg, the capital of the province, is situated at the confluence of the Assiniboine and Red rivers. It is the great commercial centre for central Canada and the greatest grain market of the whole of the British Empire. The town has many grain elevators and a great flour-milling industry. Other industries include saw-milling and the manufacture of leather, farm implements, wire-fencing, and railway iron-work.

The position of Winnipeg in the narrow passage (about 80 miles wide) between Lakes Winnipeg and Manitoba and the United States frontier, "the bottle-neck of Canada," has made it a very important railway junction. All the east-west lines converge upon the town, and there are important lines serving both the districts to the north and south.

Brandon, below the junction of the Assiniboine and Little Saskatchewan rivers, is the centre of a great wheat-growing district.

SASKATCHEWAN. (Population 757,510.)

Regina, situated about 350 miles west of Winnipeg, is the capital of the province. It is an important distributing centre and a great cattle market.

Prince Albert is a growing city in the north of the province. Situated on the North Saskatchewan River, it has an important lumber industry.

ALBERTA. (Population 588,454.)

Edmonton, the capital of the province, is situated on the North Saskatchewan in a rich coal-mining and agricultural region. It is the centre for the fur trade of the Mackenzie Basin. On the River Athabaska, to the north, natural gas is found.

Calgary, situated in the south of the province between the Bow and the Elbow rivers, is the centre of a great ranching district and is an important cattle market. It is important also as an outfitting centre for the mining camps of the Rockies.

Medicine Hat, on the South Saskatchewan, is a growing manufacturing town. It has important railway works and is the centre of a district producing natural gas in large quantities.

BRITISH COLUMBIA. (Population 524,582.)

Victoria, the capital, is situated at the south-east extremity of Vancouver Island. It is the first and last port of call not only for Canada but for all the Pacific north-west, and, in the number of vessels entering and clearing, is the second largest port of the

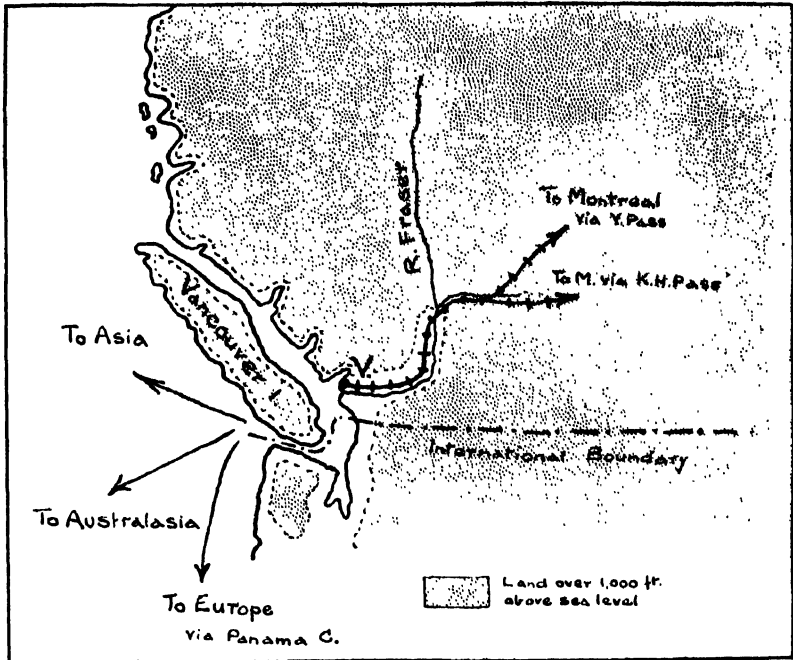


FIG. 26.—THE POSITION OF VANCOUVER.

Dominion. The harbour is a particularly fine one, as is that of *Esquimalt*, three miles distant, the headquarters of the Pacific Division of the Royal Canadian Navy. Victoria is the headquarters of the Pacific fishing fleet of the Dominion.

The city has important and varied manufacturing industries, the chief products of which are ships, hardware, machinery, furniture, and foodstuffs.

Vancouver, situated on a peninsula between Burrard Inlet and the mouth of the Fraser River, has a magnificent harbour well sheltered from the Pacific Ocean by Vancouver Island, and has become the greatest port of the Pacific coast of the Americas. (Fig. 26.) It is the nearest shipping point to the great grain-producing region of the western prairies, the export point for

the greatest stand of timber in the world, and the natural gateway for Canada's trade with the Orient and Australasia. It is served by the two great Canadian transcontinental railways and by several American roads reaching it from the south, and, in company with the other British Columbian ports, it is open at all seasons of the year. Though already of great importance, it must inevitably develop with the development of Canada as a whole.

Since the war there has been a great and steady increase in the growth of sea-borne commerce through Vancouver, particularly in connection with lumber products and grain. The opening of the Panama Canal gave the port access to the Atlantic, and British Columbian products are now exported to Europe and the Atlantic ports of Canada and the United States, ocean freights, even allowing for Canal dues, being cheaper than railway rates across the continent. The export of grain to Europe by this route has reached large dimensions.

The town has many important industries, including lumbering, shipbuilding, sugar-refining, flour-milling, pulp and paper manufacturing, and the manufacture of textiles and food products.

New Westminster, situated on the north bank of the Fraser, about 21 miles from its mouth, is a port of considerable, and growing, importance. Like Vancouver, it has greatly benefited by the opening of the Panama Canal. Lumber is the principal export, followed by mineral products, canned salmon, apples, and paper. The industries of the town include salmon and fruit canning, lumbering, the manufacture of paper, iron goods, and chemicals, brewing and distilling.

Prince Rupert, situated on Hecate Strait, near the mouth of the Skeena River, was the creation of the old Grand Trunk Pacific Railway, of which it is the western terminus. It has a fine harbour, much of it carved out of the rock at great expense, and is four hundred miles nearer to the Orient than any other North American port. Its development, however, has not fulfilled the natural expectations, and, though important as a port of call for coasting vessels, it still takes a relatively small part in foreign commerce. The town has a large salmon-canning industry.

Nanaimo is an important coal port on the east coast of Vancouver Island, about seventy-five miles from Victoria.

Rossland, in the south of the province, near the United States frontier, is the centre of a great mining district.

COMMUNICATIONS

In a country of such vast distances as Canada, internal communications are of supreme importance. The natural waterways, which proved of the utmost value in facilitating the opening up of the country before the advent of railways, are therefore, still of great importance.

Waterways.

Most parts of the Dominion are well-endowed with natural waterways, but the Great Lakes and the St. Lawrence are by far the most important. The St. Lawrence, with its system of canals above Montreal, the present head of ocean navigation for large vessels, and Lakes Ontario, Erie, St. Clair, Huron, and Superior, with their connecting canals and rivers, afford through communication for vessels drawing 14 feet or less from the ocean to the west of Lake Superior, a distance of over 2,200 miles. The lakes themselves are very deep, and their connecting canals and rivers have been deepened to give passage to large vessels—the Welland Canal, connecting Lakes Ontario and Erie, until recently the last remaining shallow connection (14 feet), having now been replaced by the new Welland Ship Canal. The Lakes, therefore, constitute a great inland sea, and, but for the inadequacy of the canals of the upper St. Lawrence, would, in effect, form an immense arm of the Atlantic, stretching into the heart of the continent, a veritable North American Mediterranean. The Governments of Canada and the United States have a scheme under consideration for the deepening of the canals and the establishment of a deep waterway along the St. Lawrence from Lake Ontario to Montreal. When this scheme is brought to fruition large ocean steamers will be able to proceed to any part of the Lakes, and wheat cargoes will be sent without break of bulk from Fort William and Port Arthur direct to Liverpool.

The route from the sea to these ports is, at present, as follows : a deepening of the river channel permits ocean-going vessels to ascend the St. Lawrence estuary past Quebec as far as Montreal. Here, except in the case of those carried in small vessels, cargoes have to be transhipped to small Lake steamers, for, above Montreal, the St. Lawrence contains many rapids. These have been passed by the construction of fourteen-foot canals, having a total length of nearly seventy-five miles, of which the chief are the Lachine, the Soulanges, and the Cornwall. By their aid a ship may reach Lake Ontario, from which the natural passage to Lake Erie is barred by the mighty Niagara Falls. These are avoided by means of the Welland Ship Canal, which raises the vessel 333 feet. From here navigation is uninterrupted until Lakes Erie, St. Clair, and Huron have been crossed and the entrance to Lake Superior has been gained. This lake lies at a slightly higher level than Lake Huron, and the St. Mary River, connecting them, forms a series of rapids. These have been avoided by the construction of the great Sault Sainte Marie, or "Soo", Canals, by means of which the vessel passes into Lake Superior and so reaches its destination. The importance of the "Soo" Canals can scarcely be over-emphasised, and the tonnage which annually passes through them is enormous ; in comparison with it that of the great Suez Canal is light.

Though this magnificent waterway system is of immense utility, it has several important drawbacks. The severity of the winter climate renders it useless during that season of the year, owing to the freezing of the St. Lawrence and the edges and approaches of the lakes. Also, the Gulf of St. Lawrence suffers very much from the prevalence of fog and, in the late spring and early summer, from the danger of icebergs, which then break off from the northern pack ice and drift south with the Labrador Current.

Besides the proposal for the deepening of the St. Lawrence above Montreal, other schemes have been put forward for the improvement of Canada's waterways. From Montreal there exists an alternative route to Lake Ontario by way of the River Ottawa and the Rideau Canal, and, though this particular route is of little commercial importance, the possibility of new routes *via* the Ottawa is clearly evident. A study of the map will show that the river is separated by only a comparatively short distance from that portion of Lake Huron called Georgian Bay, and, further, that between them lies Lake Nipissing. In 1914 a Royal Commission was set up "to enquire into and report upon the commercial feasibility and national advantages to be derived from the proposed construction of a deep inland waterway from the Georgian Bay, Ontario, to the port of Montreal, in the province of Quebec." The war put the scheme beyond the limits of financial practicability, but it is likely to be brought up again before many years have passed, for the completion of such a canal would enable ships to reach Lake Huron about a day sooner than *via* Lake Ontario.

The great river systems and their lakes in the interior—notably the Nelson-Saskatchewan and the Mackenzie-Athabasca systems—are of considerable value for inland transport in the summer months. Of the many lakes, Lake Winnipeg, in Manitoba, is the chief. Some day this great lake may be connected by canal with the Great Lakes, and so form part of that huge transport system, but at present it is merely of local importance and is destined to remain so for many years to come.

Railways.

The opening up and development of the country, particularly of the prairies and the Far West, have been the result of the great railway development, and all settled parts of Canada are now accessible by railway. There are three great trans-continental lines. (Fig. 27.) The earliest of these, the *Canadian Pacific Railway*, constructed largely with public funds, was completed in 1885. Enormous difficulties, both physical and financial, had to be overcome in its construction, and its completion stands as a great testimony to the foresight, wisdom, and vigour which have always characterised the development of the Dominion. It

is stated, with truth, that the opening of this great railway has dominated the political and economic destinies of Canada to a greater extent than any event in the later history of the country.

The main line of the Canadian Pacific Railway runs from the port of St. John, in New Brunswick, through Maine, in the United States, to Montreal. From here the line runs up the valley of the Ottawa to Ottawa and on to Sudbury. Making a detour round Lake Superior, it reaches the Lake ports of Port Arthur and Fort William, and then runs directly west to Winnipeg, the focus of all the railway systems of the Dominion. Continuing westward, it crosses the prairies *via* Brandon, Regina, and Medicine Hat, and then turns north-west to Calgary at the foot

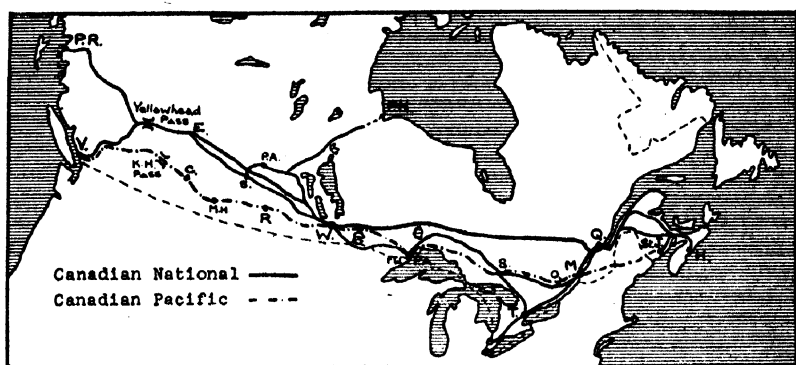


FIG. 27.—THE PRINCIPAL RAILWAYS OF CANADA.

of the Rockies, which it crosses by the Kicking Horse Pass. It then descends to the valley of the Columbia, which it crosses to make the passage of the Selkirk range by the Roger's Pass. After again crossing the Columbia and traversing the Gold Range, the line enters the valley of the South Thompson River. This leads it to the Fraser Valley, which it follows almost as far as the Pacific terminus of Vancouver.

Of the many branch lines of the C.P.R., two are of special importance. The first runs south-west from Montreal through peninsular Ontario, *via* Kingston, Toronto, Hamilton, and London, to the United States frontier. The second leaves the main line at Medicine Hat and runs *via* Lethbridge to the Rockies, which it crosses by the Crow's Nest Pass. It passes through Fernie and rejoins the main line at Hope, after serving the districts round Rossland and Nelson. A third branch, of considerable importance to the wheat trade (see Fig. 24), is that leaving the main line at Renfrew and running to Parry Sound (Depot Harbour) on Georgian Bay.

Of the remaining railways of the Dominion all but a few relatively unimportant lines are worked by the Government and

form part of the *Canadian National Railways*. These include the Grand Trunk, the Grand Trunk Pacific, the Inter-Colonial, and the Canadian Northern Railways.

The old Grand Trunk Pacific Railway runs from its lake terminus of Fort William, *via* Winnipeg, Saskatoon, and Edmonton across the prairies to the Rockies, which it crosses by the Yellowhead Pass. It reaches its Pacific terminus of Prince Rupert, *via* the valleys of the upper Fraser, Nechacco, Bulkley, and Skeena rivers. From Winnipeg the line is continued eastward, *via* Cochrane and Quebec, to Moncton in New Brunswick, whence there are lines to St. John and Halifax.

The main line of the old Canadian Northern, the third great trans-continental railway, starts from Montreal, passing by way of Ottawa to Port Arthur. From here it runs south of the Lake of the Woods, thus passing through United States territory, to Winnipeg and on to Edmonton. It crosses the Rockies by the Yellowhead Pass and follows the valleys of the North Thompson, Thompson, and Fraser rivers to the coast at Vancouver. This line is connected with the ports of St. John and Halifax by the old Intercolonial Railway.

The many branches of these great lines have played a very large part in the opening up of the country, and a new line, now in its final stages of completion, running from Prince Albert, on the Canadian Northern line of the Canadian National Railways, *via* Hudson Bay Junction and Le Pas to Port Nelson on Hudson Bay, bids fair to effect a further advance. When the line is finished it will provide an alternative and shorter route from the wheat-growing regions of the Dominion to the British Isles. Though the utility of the route will be greatly impaired by the short season (little more than two months) during which Hudson Bay and Hudson Strait are safe for navigation, it will do much during that short period to relieve the congestion occurring on the existing lines during the autumn, when enormous quantities of the season's grain crop begin to move eastwards.

Unlike the Australian railways those of Canada are all of standard gauge, 4 feet 8½ inches, and amalgamation and unification have presented no difficulties such as have to be faced in Australia.

It will be realised that as Canada extends over 80° of longitude, it would lead to great inconvenience if one "railway time" were used, for this would differ increasingly from the local time as the distance covered, eastward or westward, increased. This difficulty is overcome by the division of the Dominion into five time-belts, in each of which the standard time is one hour earlier than that to its eastward. These are Atlantic, 60°-75°; Eastern, 75°-90°; Central, 90°-105°; Mountain, 105°-120°; and Pacific, 120° westward to the coast. Thus when it is noon at Halifax, according to standard time it is 11 a.m. at Toronto, 10 a.m. at Winnipeg, 9 a.m. at Calgary, and 8 a.m. at Vancouver.

NEWFOUNDLAND AND LABRADOR

Newfoundland, the oldest British colony, is situated at the mouth of the Gulf of St. Lawrence, between latitudes 46° and 52° N., athwart the shortest route from Britain to North America. It is separated from its great dependency of Labrador by the narrow Belle Isle Strait, and from Cape Breton Island (Nova Scotia) by Cabot Strait. The area of the Dominion is 43,000 square miles, or about 1½ times the size of Ireland.

Physical Conditions.

The *climate* of the island, which is mainly an upland area with high, rocky coasts, deeply indented by the sea, is greatly affected by the Labrador Current. This passes south along the east coast, bringing ice-floes during the late winter and icebergs throughout the year, and affecting the climate, directly, by its cooling influence and, indirectly, by the fogs it causes. Generally speaking, the winters are long and cold, with heavy falls of snow, and the summers are cool and damp. As a consequence of the climate, much of the island is covered with marsh and moorland, and rivers and lakes are numerous. Also many parts are heavily timbered, though much of the forestland is thin and poor.

Economic Development.

The principal industries of the Dominion are *fishing*, the production of *pulp* and *paper*, *mining*, and *lumbering*. At present manufacturing, with the exception of pulp and paper, is of little importance, and the bulk of the manufactures required has to be imported, chiefly from Canada, Great Britain, and the United States.

FISHING.—Ever since the discovery of the island in 1497, Newfoundland has been famous for her *cod-fishing industry*, and it is still by far the most important factor in her commerce. The great majority of the population, which is mainly concentrated on the coast, is either directly or indirectly dependent on cod-fishing for a livelihood, and the products of the industry form the bulk of the exports.

There are three branches of the industry—the shore fishery; the Bank fishery; and the Labrador fishery, the first of which is the most important. During the summer cod-fish are caught near the shore all round the coast by means of hooks, trawls, and cod-traps. It is on the Newfoundland Banks, situated to the south of the island, however, that the largest species of cod is found. The third branch is conducted by migratory Newfoundlanders who reside on the Labrador coast from June to September each year.

Dried codfish are exported in large quantities to the Mediterranean countries, the West Indies, and Brazil. *Oil*, both refined, medicinal "cod-liver oil," and the common "cod" oil, are important products of the industry, and Newfoundland is one of the world's chief sources of cod-liver oil.

Large quantities of other species of fish are caught, notably *salmon*, *halibut*, and *herring*, and the *seal* fishery is of considerable importance in the winter and spring.

Forest Products.

The forest products of the island are of increasing importance, and industries connected with them provide a good deal of employment. The *pulp* and *paper* industry is the most important, and its production is taken exclusively by Great Britain. The Dominion is extremely rich in water-power, on which this industry is so largely dependent, and great mills have been established in several parts of the island where it is available, notably at Grand Falls and Bishop's Fall. The annual output of "newsprint" from the Grand Falls and allied plants is over 80,000 tons, valued at over £1,400,000, and 30,000 tons of pulp, valued at over £100,000.

Numerous saw-mills are to be found in many parts of Newfoundland. Most of the timber cut is for local use, but in recent years a large export of *pit props*, chiefly to South Wales, has been created.

Mining.

The richness of the fisheries of the Dominion for long obscured the possibilities of the country for the production of minerals. The island is, however, very richly mineralised, and traces of almost every known metal have been found there. Lack of capital for the proper working of the deposits is a great drawback, and, with but few exceptions, they remain undeveloped.

Iron ore is found in many districts, but the only mining which has yet taken place is in connection with the deposits of Bell Island, a small island in Conception Bay. Here is located the third largest hematite deposit in the world. The iron is exported chiefly to Canada.

Copper deposits are found in many parts of the country, and large quantities of high-grade ore have been mined there. At present, however, the industry is inoperative, due to the cheap production in many other parts of the world, and the consequent prevailing low prices.

Coal deposits are as yet untapped to any important extent, but their extent and value are known to be great.

Other minerals found include oil shales, lead, magnetite, manganese, and molybdenum.

Agriculture.

Though it is estimated that some 2,000,000 acres are suitable for agricultural development, the physical conditions combine to render the industry relatively of little importance. The climate is unsuitable for the production of wheat, and the production of foodstuffs, with the exception of fish, is below local requirements, large quantities of flour, fruit, vegetables, cheese, butter, etc., having to be imported from Canada and the United States.

Communications and People.

The climate is mildest in the south-eastern bays and peninsulas, and here the bulk of the population is found. The Avalon Peninsula, on which *St. John's*, the capital and chief port, stands, has, indeed, a less severe winter than Nova Scotia, farther south. *St. John's* has a fine harbour which remains open all the year, and is the port of call for ships from Great Britain, Canada, and the United States.

A railway runs from *St. John's*, *via* the heads of the inlets on the south-east coast, to the mouth of the Exploits River. It then runs inland up the valley of that river to Grand Falls, and strikes across country to Bay of Islands, and, running south along *St. George Bay*, terminates at Port Basque, near Cape Ray.

Labrador.

Like Newfoundland, Labrador is highly mineralised. The deposits are, however, as yet untapped, though iron-ore fields have been surveyed ready for development. The country also is rich in heavy timber, and, as water-power is abundantly available, saw-mills are being built, and the establishment of pulp-mills is only a matter of time. The forests contain large numbers of fur-bearing animals, and the innumerable rivers are rich in fish, particularly salmon. The coastal fisheries already yield great quantities of *cod*. Lack of communications and transport facilities are the chief drawback to development.

Climatically, the country is greatly affected by the Labrador Current, and the winters are long and severe. During the summer, however, the temperature may reach 90° F. in the shade. The people are chiefly Eskimos, engaged in fishing and trapping.

CHAPTER VIII

BRITISH AMERICAN COLONIES

THE American territories under British rule, other than Canada and Newfoundland, consist of colonies and their dependencies. With few exceptions they are islands and are situated in the great gulf lying between the east coast of North America and the north-east coast of South America.

THE BRITISH WEST INDIES

The West Indies is the name given to the large number of islands which extend in a great curve across the entrance to the Gulf of Mexico and the Caribbean Sea from near Florida, in the United States, to within seven miles of the coast of Venezuela, in South America. This great mass of islands can be divided into three groups: (1) the *Greater Antilles*, containing the largest islands—Cuba, Haiti, Jamaica, and Porto Rico—of which Jamaica, with its dependencies, is the only British possession; (2) the *Lesser Antilles*, forming a long chain of many smaller islands—the Leeward Islands in the north, and the Windward Islands in the south—stretching from the east of Porto Rico to the South American coast; and (3) the *Bahamas*, an entirely British group, lying to the north of Cuba.

The British colonies in the West Indies, usually spoken of collectively as the *British West Indies*, with the area, population, and chief town of each, are set forth in the table given on page 163.

GENERAL PHYSICAL CONDITIONS

With the exception of Barbados and the Bahamas, the islands are very mountainous, in some cases mere rocks; they are, in fact, composed of the peaks of a vast submerged mountain chain, part of which is volcanic. As, however, they lie almost entirely within the zone of the north-east trade winds, the mountains are not barren, but are covered with dense tropical vegetation, and their spurs, running down to the coasts, form valleys of great beauty and fertility. "It would be impossible to exaggerate the exquisite beauty of the West Indian islands. Cloud-capped mountains covered from base to summit with a wealth of tropical vegetation, valleys densely cultivated with cacao, sugar-cane, and fruit-trees, surf-bound coasts fringed with

graceful coco-nut palm trees, coral strands, whose brilliant whiteness are in pleasing contrast with the indigo blue seas of these low latitudes, form pictures of surprising charm.”¹

Colony.	Area in square miles.	Estimated population, 1921.	Chief Town.
1. Jamaica, with its dependencies : . . .	4,207	858,118	Kingston
(a) The Turks and Caicos Islands . . .	224	5,612	Grand Turk
(b) The Cayman Islands . . .	89	5,253	George Town
2. The Bahamas . . .	4,404	59,928	Nassau.
3. The Leeward Islands, including :—			
(a) Antigua . . .	108	29,767	St. John
(b) St. Kitts . . .	65	22,370	Basseterre
(c) Nevis . . .	50	11,569	Charlestown
(d) Anguilla . . .	35	4,275	Roa
(e) Montserrat . . .	32	12,120	Plymouth
(f) Dominica . . .	305	38,000	Roseau
(g) The Virgin Islands . . .	58	5,082	Roadtown
4. The Windward Islands, including :—			
(a) Grenada . . .	133	66,302	St. George's
(b) St. Lucia . . .	233	53,221	Castries
(c) St. Vincent . . .	140	44,447	Kingstown
5. Barbados . . .	166	156,312	Bridgetown
6. Trinidad and Tobago . . .	1,868	365,913	Port of Spain

As the West Indies are widely scattered, the conditions affecting their climate are subject to considerable variation. They enjoy a uniformly high temperature throughout the year, however, the temperature varying on the average from about 75° F. in the cooler months to about 85° F. in the warmer months. The mountainous nature of the relief causes the trade winds, here blowing almost from due east, to bring rain at all seasons ; but in summer the rains due to relief are reinforced by those due to convection. Summer is, therefore, more rainy than

¹ *The Oxford Survey of the British Empire*, vol. iv.

winter, at which season the leeward slopes of the mountains are fairly dry. As a result of this, position on the windward or leeward slopes has an important climatic effect ; for example, in Jamaica, Kingston, situated in the lee of the mountains, has a mean annual rainfall of 36 inches, while at Port Antonio, on the north-east coast, it is 139 inches. In summer the rainfall comes in heavy thunder-storms during the heat of the day, but in winter the rain is both lighter and more continuous, often taking the form of drizzle. During the summer the islands suffer from violent tropical cyclones known as *hurricanes*, which occur chiefly in the months of August, September and October, and often work great destruction in island after island as they pass over from east to west. Apart from this, however, the climate of the islands, although tropical, is a particularly pleasant one. The West Indies, indeed, are becoming increasingly popular as a health resort, and many visitors from both Europe and the United States spend the winter there.

The islands contain a wealth of good harbours, but, as the trade winds drive the waves on to the eastern coasts and cause them to be surf-beaten and dangerous to shipping, all the larger and more important ports are found on the leeward, or western, coasts. Most of the harbours are the drowned valleys of the old mountain chain, but where they are almost land-locked, as for example, St. George's and Castries, they are without doubt the craters of submerged and long extinct volcanoes.

Some of the islands are little more than single volcanic cones, and the whole group is subject to volcanic and seismic disturbances. The eruption of La Soufrière in St. Vincent, in 1902, and the earthquake of 1907, which wrought such havoc in Kingston, Jamaica, both of which caused great loss of life, are the most recent of a long series of disasters.

JAMAICA

Jamaica is by far the largest and most important of the British West Indian islands. It has excellent harbours, and lies in the direct track of vessels proceeding from Europe and the eastern coast of the United States and Canada to the Panama Canal. It therefore is admirably situated for commerce, and Kingston is, indeed, the great port for the whole of the British West Indies. The island is extremely mountainous, consisting of a great backbone which reaches its greatest elevation in the east, where the highest peak of the Blue Mountains towers some one and a half miles in the air, and many ridges gradually descending to the coastal plains on the north and south. Of the many streams flowing down the valleys, all are too rapid for navigation but the Black River, which is used only by small craft.

The igneous rocks of which the island is composed have weathered into a rich, fertile soil which is very productive. This and the continuously warm climate with its plentiful summer rainfall, make it possible for most of the staple products of the tropics to be cultivated successfully, and on these the economic life of the islands is based. It is a very far cry from the early days when Port Royal, in Kingston harbour, the stronghold of such famous buccaneers as Kidd, Blackbeard, and Morgan, was the richest city in the world, and bronzed and bearded seamen swaggered about decked out in the finest silks of the Orient and costly jewellery taken from the prizes moored at the wharves. The wealth of the island is now neither so fabulous nor so adventurously acquired, but it is nevertheless considerable.

Products and Trade.

The crop to which the greatest acreage is devoted is *bananas*, and these form about half the total exports by value. In a good year Jamaica is the largest producer in the world, and, for the transport of the fruit, is served all the year round by fine steamers which even offer comfortable accommodation for passengers. The banana groves are situated chiefly in the east of the island, and *Port Antonio* is largely a banana port.

Sugar, produced from the cane, was at one time the chief product, and, though still of great importance, it now takes second place. *Rum*, of excellent quality, a by-product of the sugar industry, is another important export. Others of less importance are, *coffee*, *cocoa*, *logwood extract*, *pimento*, *ginger*, *coconuts*, *copra*, *oranges*, and *cigars*.

The trade of Jamaica is carried on almost entirely with the United States, Great Britain and Canada. Of these three countries the United States has the greatest geographical advantage, as, indeed, in the case of all the islands, and it is, therefore, not surprising that she takes the lead in exporting to Jamaica, accounting for between 60 and 70 per cent. of the total imports. While, however, Great Britain supplies only about a fifth, she is Jamaica's best customer, taking between 60 and 70 per cent. of the total exports. Canada's share in Jamaican trade is still comparatively small, but the establishment of reciprocal preference and direct shipping services should cause it to grow to much larger proportions.

The imports are chiefly food-stuffs and manufactured goods of all kinds.

Most of the trade is carried on through the port of *Kingston*. It has a fine harbour covering an area of 16 square miles, protected by the Blue Mountains from the trade winds, and is a defended oil and coal bunkering port. It is connected by road and rail with all parts of the island, trunk lines running westwards the length of the island to *Montego*, the northern port,

and north-eastwards to *Port Antonio*. The importance of the port is enhanced by the central position of the island and its situation opposite the Windward Passage, between Cuba and Haiti, the point of divergence of ships proceeding from the Panama Canal to the United States, Canada, and Great Britain.

The Dependencies.

The dependencies of Jamaica are of comparatively little importance.

The Turks and Caicos Islands, of which Grand Turk, a small island seven miles long and about one and a half wide, is the largest, are populated mainly by negroes. The chief products are *salt* (obtained by solar evaporation of sea water), *sponges*, and *sisal fibre*.

The Cayman Islands still yield occasional finds of buried treasure, showing that at one time they were a rendezvous of pirates. *Coconuts* are their chief product, but the islands are well wooded and produce hardwoods and dye-woods.

THE BAHAMAS

The Bahamas, consisting of a great number of small coral islands and rocks of which only about twenty are inhabited, stretch from the coast of Florida to Haiti. The chief islands are New Providence (on which is the capital and chief port of the colony, *Nassau*), Abaco, Harbour Island, San Salvador, Grand Bahama, Long Island, Mayaguana, Exuma, Eleuthera, Watlings Island, Andros Island, Great Inagua, Rum Cay, Acklin's Island, and Crooked Island.

The islands, which are low-lying, have a small rainfall and this, with the exposure to Atlantic winds, is responsible for the scarcity of trees. In summer the climate is very hot, but in winter it is delightful, and, at that season, the islands are a favourite resort for Americans.

The chief industry is sponge-gathering, and *sponges* form the chief export. The chief crop grown for export is *sisal fibre*, but the situation of the islands has resulted in the development of an important export of *winter vegetables* and *tomatoes* to the United States. Other exports are *pine-apples* (which are canned locally), *fish* and *salt*.

With the exception of fruit and vegetables almost all the necessities of life have to be imported. The chief trade is with the United States, that with Great Britain being insignificant.

THE LEEWARD ISLANDS

The Leeward Islands border the Caribbean Sea on the north-east, and stretch between latitudes 15° N. and 18° N. Their

tropical climate is relieved by the altitude of much of the land and by the constant sea breezes, so that it is generally healthy. The soil is rich and fertile, and the islands are very productive, but the crops are liable to destruction by hurricanes.

The British islands of the group form a single Crown Colony : a federation of the former colonies—now “Presidencies”—of Antigua, St. Kitts and Nevis, Dominica, Montserrat, and the Virgin Islands.

ANTIGUA.—Antigua is the seat of government of the colony, and the Governor-in-Chief resides there. The island's chief industry is the cultivation of *sugar-cane*, and there are two central sugar factories fitted with modern appliances for extracting the juice. Large quantities of sugar are exported, along with molasses, tamarinds, pine-apples, and arrowroot. The capital is *St. John*.

Barbuda and *Redonda* are small dependencies of Antigua. Barbuda produces small quantities of cotton, maize, pepper, tobacco, and vegetables, and Redonda has a phosphate industry.

ST. KITTS AND NEVIS.—These islands, together with Anguilla, form one Presidency, which, though situated in the tropics, has a healthy climate with a temperature varying from 78° F. to 85° F.

St. Kitts, the chief island of the Presidency, is the oldest colony of the British West Indies. It is very effectively cultivated for the production of *sugar* ; all the coastal lands are covered with estates, and only the central mountain cone of the island, Mount Misery, is left uncultivated. *Cotton*, also, is an important product.

Nevis, like St. Kitts, is volcanic in character, and both islands, which are separately by a strait only three miles wide, are liable to earthquakes. *Sugar-cane* and *cotton* are the chief products.

Anguilla lies about 60 miles to the north-west. *Salt* is the chief product, but *cotton* is being cultivated with considerable success.

DOMINICA.—The largest island of the colony is Dominica. The scenery is mountainous and very picturesque and the climate is healthy throughout the year, but particularly pleasant during the winter. The rich, volcanic soil of the island is very fertile and all tropical products can be grown with success. It is on the *lime* industry, however, that Dominica depends chiefly. The lime-tree has proved well worth special attention, as it yields no less than eight commercial products. These are concentrated lime juice, raw lime juice, citrate of lime, citric acid, essential oil of limes, otto of limes, green limes, and pickled limes. They form the chief items in the list of exports, less important items being cocoa and coconuts.

MONTSERRAT.—Montserrat is considered the most healthy

and beautiful of the Antilles, and among many picturesque islands it is indeed a beauty spot. The hills which rise from the sea on all sides are cultivated up to a height of 1,000 or 1,500 feet, the volcanic soils being very fertile. The island has long been famous for the cultivation of *limes*, and though the lime industry is still important, the production of *cotton* now takes first place. The chief exports are cotton-seed meal, cotton, cotton-seed oil, onions, limes and lime-products, and sugar.

THE VIRGIN ISLANDS.—The British islands of this group, which lies to the westward of Porto Rico, number about thirty-two. Some of these are mere rocky islets of no economic importance, but many are fertile and provide good pasture for cattle, sheep, and goats. The chief British islands are Tortola, Virgin Gorda, and Anegada. The capital of the islands is *Roadtown*, on the south-east coast of Tortola.

Sugar, cotton, coconuts, and pine-apples are being produced in increasing quantities, and a *tobacco* and *cigar* industry has been established.

TRADE RELATIONS.—The chief exports of the colony as a whole are sugar, limes and lime-products, and cotton. Of these the sugar is sent chiefly to Canada and Great Britain, the cotton to Great Britain, and the limes and lime-products partly to the United States and partly to Great Britain. As with the other West Indian colonies, the United States supplies most of the imports, consisting chiefly of foodstuffs and manufactured goods, the United Kingdom and Canada supplying the balance.

THE WINDWARD ISLANDS

The Government of the Windward Islands is composed of the three colonies of Grenada, the seat of government, St. Vincent and St. Lucia and their dependencies. These islands, bordering the Caribbean Sea in the south-east, are all mountainous in character and have a healthy climate. Their volcanic soil is very fertile, and they are less liable to the visitation of hurricanes than are the Leeward Islands.

GRENADA.—The mountainous parts of Grenada are clothed with tropical forests rich in timbers, and the lowlands are well watered and highly cultivated. The island is the most productive of the whole group and has a growing *cocoa* industry, besides being important for the production of *spices* and *cotton*. Of the chief exports—*cocoa*, *nutmegs*, *mace*, and *cotton*—over half goes to the British Isles; the United States and Canada taking the balance.

The colony shares with St. Vincent the administration of the *Grenadines*, a chain of small islands lying between the two colonies.

ST. VINCENT.—St. Vincent lies about 100 miles west of Barbados. It is particularly noted for the quality of the *cotton* it produces, which is the best in the Empire, and for the excellence of its *arrowroot*. These two products form the chief exports of the colony, others of less importance being sugar, molasses, rum, cassava, cocoa, coffee, and spices.

ST. LUCIA.—The largest of the Windward Islands is St. Lucia, the most historic and perhaps the most beautiful. It consists of a central range of well-wooded hills, whose spurs, sloping down to the coasts, form well-sheltered valleys, and for the most part it is covered with tropical vegetation. The chief exports are *sugar, cocoa, coconuts, copra, limes* and *lime-products, logwood, molasses, syrup, and bananas*.

On St. Lucia is *Castries*, the chief port of the Windward Islands, and one of the finest harbours in the West Indies. Although off the main track of shipping it is an important port of call and a coal and oil bunkering station. With the opening of the Panama Canal, however, Balboa has become the chief oil port for ships passing between the Pacific and the Atlantic.

As elsewhere in the West Indies, most of the imports of these colonies are supplied by the United States.

BARBADOS

Barbados, the most easterly of the West Indies, enjoys a particularly healthy climate and, being on the direct mail steamship services, is much visited as a health resort by tourists, especially during the winter months. In area it is about the same size as the Isle of Wight, and is one of the most densely peopled areas on the earth, having about 950 inhabitants to the square mile. The volcanic soil and the climate are particularly favourable to agriculture, and practically the whole of the island is under cultivation. This was the first British island in which the sugar cane was planted, and by far the most important product is *sugar*, the output being greater than that of any other British West Indian island. *Cotton*, also, is important, while other products are fruits and vegetables, coconuts and coffee.

The chief exports of the colony are *sugar, molasses, rum, and cotton*, the imports consisting of food-stuffs and manufactured goods. Besides the local trade there is a considerable transit trade, goods being imported for transhipment to other islands.

TRINIDAD AND TOBAGO

Trinidad and Tobago, a small island lying 26 miles northeast of Trinidad, together form a Crown Colony. They are the

most southerly of the West Indian islands, lying off the coast of Venezuela, from which Trinidad is separated by the Gulf of Paria. This island is about a quarter the size of Wales and is crossed from east to west by three roughly parallel ranges of hills, one along the north coast, another through the middle of the island, and the third along the south coast. The soil is rich and productive, hurricanes are unknown, the tropical climate is both healthy and conducive to the growth of vegetation, and the valleys are well sheltered from the prevailing winds. These conditions make agriculture an important industry. Further, unlike the other islands of the West Indies, Trinidad has valuable mineral resources.

The chief agricultural products of Trinidad are *cocoa*, *sugar*, and *coconuts*, but many other tropical and sub-tropical products are grown, notably coffee, oranges, bananas, limes, and rubber. The forests yield *hardwoods* of many varieties. Of the mineral products the chief are *petroleum* and *asphalt*, the latter obtained from the famous Pitch Lake of La Brea, which is so hard that men and carts can cross it, and contains an apparently inexhaustible supply.

The most important exports are cocoa, sugar, and petroleum, but others are copra, coconuts, refined kerosene, asphalt, bitters, molasses, and rum. The British Isles rank first among the consumers of the produce of the colony, followed closely by the United States. Of other consumers Canada and France are the chief. As regards the import trade, however, the United States is first, followed by Great Britain and Canada. The imports consist of manufactured goods of all kinds, particularly textiles, hardware, and agricultural machinery.

Port of Spain, the capital of the colony, is also its chief port. It is situated at the north-western corner of Trinidad on a well-sheltered bay of the Gulf of Paria. It ships most of the exports, receives most of the imports, and, in addition, has a considerable entrepôt trade. The town is one of the finest in the West Indies.

Other towns are *San Fernando*, a growing port in connection with the oil industry, situated about 30 miles south of Port of Spain, Princetown, and Arima.

POPULATION AND DEVELOPMENT

The total population of the British West Indies is about two millions, but the number of white people living in the islands is comparatively small. In spite of the general healthiness of the climate the people of British blood, chiefly officials, planters, and traders, form only about 5 per cent. of the population. The great majority are negroes, the descendants of emancipated slaves. The prosperity enjoyed by the islands in the seventeenth and eighteenth centuries was based on the abundant supply of

cheap labour, and many thousands of slaves were imported annually from Africa in British ships. When, in 1807, the Slave Trade was abolished, Jamaica alone possessed 323,827 slaves, and this island has to-day about half the total population. With the emancipation of the slaves an acute labour problem arose, for the freed negroes, revelling in their freedom, refused to continue working. Accordingly, fresh labourers had to be secured, and the introduction of East Indians was begun; an experiment which proved so successful that the stream of East Indian immigrants, not only to the islands, but also to British Guiana, has continued ever since, and they now form a large proportion of the population, particularly in Trinidad. As contrasted with the negro they are excellent workers, though the high density of the population now compels even the negro, usually so indolent, to work hard in order to live. There are also considerable numbers of Chinese, but of the original inhabitants, the Arawak and Carib Indians, very few remain in the islands.

All the islands are old settled regions of some historic and traditional importance, but, from an economic point of view, they are not of very great value at present, although their potential supply of products is considerable. They achieved great fame and prosperity in the early days of the sugar trade, and huge fortunes were made by the planters of the sixteenth, seventeenth, and eighteenth centuries, largely through the exploitation of slave labour. With the abolition of the slave trade and the emancipation of slaves, sugar cultivation was no longer an alluring prospect, for while a modest competence could still be expected, the planters did not consider the reward adequate. The rivalry of the beet sugar in the nineteenth century completed the depression which lasted until the Great War, when the cane sugar industry revived. It is noteworthy that Cuba obtained its great lead as a sugar producer as a result of the retention of slavery, which gave it an immense advantage over the British West Indies, and that the annexation of the island by the United States opened to it the American market and so further advanced its position as the world's chief producer.

The West Indians have not been lethargic, however, for the establishment of the Imperial Department of Agriculture in the islands stimulated the planters to develop along new lines and to exploit new fields, and they no longer have all their eggs in one basket. Apart from the fact that the climate of the islands is healthy and pleasant and attempts have been made to attract visitors to the innumerable health resorts which have developed, cultivation of the land and the growth of crops has proceeded apace. The banana, above all products, has brought vast wealth to the islands, and special steamship services are arranged for its transport. Prospects for the future, too, are particularly bright with regard to the cultivation of cocoa, cotton, tobacco, and rice.

Development is sadly hampered, however, by lack of co-operation between the islands, which have little intercommunication and few interests beyond those of their own island. Communication is regulated by the fruit trade, and passenger traffic is frequently delayed on that account. Sometimes it is impossible to go from one island to another for months, while transport between Jamaica and Antigua is *via* New York. There is no uniformity in the governments and constitutions of the islands. Some are Crown Colonies, others, in varying degrees, under the control of the Colonial Office, while one or two, with a governor appointed by the Imperial Government, are almost autonomous. There is no High Commissioner to represent them as a body, and separate tariff duties in each island make for further segregation.

Attempts have been made in the direction of a Federation of the British West Indies, and inter-island conferences are held periodically, while the Imperial College of Tropical Agriculture established in Trinidad in 1923, and the Imperial Department of Agriculture are symptoms of this tendency. Culture in the West Indies is of a high order and scientific development has vast possibilities.

BRITISH HONDURAS

British Honduras is a Crown Colony lying about 700 miles west of Jamaica on the western shore of the Caribbean Sea. It is bordered by Yucatan on the north and west and by Guatemala on the west and south. In area the country is rather larger than Wales, but its population is comparatively small, and is composed chiefly of natives.

A coastal plain, extending the whole length of the country, with a width of from 10 to 15 miles, gives place to hilly country on the west and south-west, where there is a healthy open country with natural grass-lands. Elsewhere, however, the region is thickly clothed in tropical forest, the product of the hot, wet climate. The prevailing trade winds bring a heavy rainfall, specially in summer, and in the north the coastal plain, everywhere unhealthy, is rendered more so by the presence of swamps.

The forests containing many valuable timbers and forest products are the chief source of wealth, the principal exports of the colony being *mahogany* and *chicle*, a gum which is the basis of chewing-gum, and is obtained from the sapodilla tree. Unfortunately, the mahogany forests have been worked unscientifically for two centuries or more, and the increasing inaccessibility of the trees is a big drawback to the industry. Most of the country, however, is still virgin forest with great resources in land, timber, and water-power waiting to be utilised. Other forest products exported are *rosewood*, *cedar*, and *logwood*, but after the two great

exports of mahogany and chicle, the coastal plantation products of *bananas*, *coconuts*, *citrus fruits*, and *cocoa*, are the most important.

The chief town and seaport, *Belize*, situated at the mouth of the Belize River, has more than a local importance, for it acts as an entrepôt for the neighbouring states, Guatemala, Honduras, and the Yucatan region of Mexico. It has no harbour, however, and vessels have to lie off shore in the roadstead.

BRITISH GUIANA

British Guiana, the only British colony in South America, is a Crown Colony situated on the north-east coast of that continent. The country, which is about as large as Great Britain, is bounded on the west by Venezuela and Brazil, on the east by Dutch Guiana, and on the south by Brazil. It has a sea-coast of some 300 miles and extends inland for about 600 miles.

The colony lies between the equator and 8° N. latitude, so that the climate is naturally hot and wet. The steady north-east trade winds, however, counteract the equatorial heat to some extent, though they also bring a very heavy rainfall, which averages about 140 inches per annum and causes the coastal regions to be swampy. The country may be divided into three natural regions as follows:—

1. *The Coastal Region*, low-lying, in parts below sea-level, and swampy, with a very warm, damp climate. Defences keep the sea from encroaching, and at present this is by far the most important part of the whole country.

2. *The Forest Region*, lying south of the coastal plain, and consisting of a densely forested hilly region with a hot, wet, malarial climate.

3. *The Savannah Region*, occupying the remainder of the colony. This region is much more elevated than the forest region and contains three mountain ranges. Here the heat is tempered by altitude and the rainfall is plentiful but not excessive. In the south-west there are extensive natural grass-lands.

There are several large rivers in the colony, but the hilly character of the interior causes them to be interrupted by rapids and falls. Transport and communication is chiefly by river, however, and the *Essequibo*, *Demerara*, and *Berbice* all are important in this respect, the Essequibo and its tributaries alone providing 450 miles of navigation.

By far the most important product of the colony is *sugar*, which accounts for more than half the exports. This is cultivated by Indian coolies in extensive plantations on the coastal plain. A large area, however, is devoted to the production of *rice*, for which the swampy conditions are admirably suited, and a considerable area is given up to the *coconut* palm, which does

well and is now being extensively planted. Smaller areas of the coastal plain are planted with *coffee*, *cocoa*, *rubber*, and *limes*.

Behind this very productive coastal strip, the dense forests stretching back to the savannahs contain many valuable hardwoods, of which the chief are *greenheart*, peculiar to British Guiana, *mahogany*, *ebony*, and *cedar*. Here, also, large quantities of *balata* are collected. The rolling grass-lands in the south support a number of *cattle*, *sheep*, *goats*, *pigs*, and *horses*, but their possibilities as a great pastoral farming region are as yet little developed.

As regards mineral wealth, the hills of the colony are believed to contain rich deposits. Unfortunately means of communication with them are poor, and the only minerals of economic importance at present are *gold*, *diamonds*, and *bauxite*, of which there are huge and easily accessible deposits.

The chief *exports* in the order of value are *sugar*, *diamonds*, *rum*, *balata*, *rice*, and *timber*. The *imports* consist chiefly of food-stuffs, textiles, and machinery. Both as regards exports and imports, Great Britain has the biggest share in the trade, followed by Canada and the United States.

The population is concentrated along the cultivated coastal strip and is largely coloured, only about 13 per cent. consisting of Europeans. The East Indians form the largest section, about 40 per cent., other non-Europeans being negroes, Chinese, and aboriginal Indians.

Georgetown, the capital and chief seaport, is situated on the right bank of the mouth of the Demerara River, here three-quarters of a mile broad. The city is connected by rail with *New Amsterdam*, 70 miles distant, at the mouth of the Berbice River, the only other town of importance in the colony.

BERMUDA

Bermuda is an isolated group of many small islands situated in the open Atlantic nearly 700 miles from the North American coast, and about midway between the West Indies and Nova Scotia. Their total area is only 19 square miles and the population of 20,000 is concentrated in about twenty of the largest members of the group, the majority of the islands being uninhabited coral islets. The whole group forms a colony which enjoys a considerable measure of self-government.

In summer the damp heat is very oppressive, but the mild, healthy winter climate of the islands makes them a favourite winter resort for Americans and Canadians, for whose accommodation large hotels have been built. The tourist industry is, indeed, the mainstay of the colony. The mild winters, however, are particularly favourable to the cultivation of *early vegetables*, chiefly potatoes and onions, and cut flowers for the New York

market, with which city there are regular steamship sailings, and practically the whole trade is carried on with the United States.

The capital and chief town of the colony is *Hamilton*, an important British naval base and coal and oil bunkering station.

THE FALKLAND ISLANDS

The Falkland Islands lie about 300 miles east of the Strait of Magellan, in the South Atlantic. The group of islands, more than a hundred in all, forms a Crown Colony to which are attached, for administrative purposes, South Georgia, the South Shetlands, the South Orkneys, and Graham's Land. The only inhabited islands of the group, which covers an area of 6,500 square miles, are the two largest islands, West Falkland and East Falkland.

The islands lie in the track of the stormy westerly winds throughout the year and experience an inclement climate, the summers being mild and rainy and the winters bleak and stormy. The hilly nature of the islands, over 2,000 feet in places, accentuates the unpleasant nature of the climate, and their exposed position is inimical to tree growth. The natural pasture with which they are clothed is responsible for the staple industry, that of *sheep-rearing*. *Whaling*, however, is almost equally important, the fleets operating in the open waters round South Georgia all the year round.

Port Stanley, the capital and chief port, with a population of about 900, is the only settlement of importance and ships the exports of whale produce, guano, wool, hides, sheepskins, and tallow, and receives the varied imports. The trade is chiefly with Great Britain.

CHAPTER IX

THE INDIAN EMPIRE

THE Indian Empire comprises all that part of the Indian Peninsula which is, directly or indirectly, under British rule or protection, and the two great provinces of Baluchistan, on the west, and Burma, on the east, which lie outside the peninsula. Beyond the sea it includes the Andaman and Nicobar Islands, the Laccadive and Minicoy Islands, Aden, and Perim, in addition to the protectorates over Socotra, Bahrein, and various short strips along the Arabian coast from Aden to the Persian Gulf. It may be divided into two categories—the British territories, “British India,” and the Native states. The latter, some 700 in number, are widely scattered, and vary in size and prestige from Hyderabad, 82,698 square miles in area, larger than England and Scotland combined, to those covering but a few square miles, such as Lawa, in Rajputana. In matters civil and military, the Indian Empire is under one supreme authority, the Viceroy and Governor-General-in-Council, and the relations of the native princes to British rule differ widely. Some are practically independent rulers with complete jurisdiction over their subjects, while others are under tolerably strict control, but all are debarred from making war on one another and from forming alliances with each other or with external states. As a rule, however, they govern their states with the aid of the advice of a British political officer (in the larger states, British Resident) appointed by the Governor-General. The native states forming part of the Indian Empire occupy more than a third of its total area and contain more than a fifth of its entire population.

The British territory comprises fifteen provinces, each with a separate administration, some under a Governor and others under a Chief Commissioner. In those under a Governor, *viz.*, Bengal, Madras, Bombay, Bihar and Orissa, the United Provinces, Punjab, the Central Provinces, Assam, and Burma, the functions of government relating to provincial matters are now practically definitely transferred to Indian Ministers, the Governor-General-in-Council retaining control over the Provincial Governments only in the administration of matters concerning the country as a whole. Thus both British and Indians share in the conduct of the Government, the Governor co-ordinating the work of both sections. The remaining six provinces

—the North-West Frontier Province, British Baluchistan, Delhi, Ajmer-Merwana, Coorg, and the Andaman and Nicobar Islands—are under Chief Commissioners, who are under the direct control of the Governor-General-in-Council. For purposes of local administration the provinces are usually formed into divisions under Commissioners, and then divided into districts, these being the units of administration.

PHYSICAL FEATURES

The total area of the Indian Empire is 1,805,332 square miles, and it is to be expected that in a region of such enormous

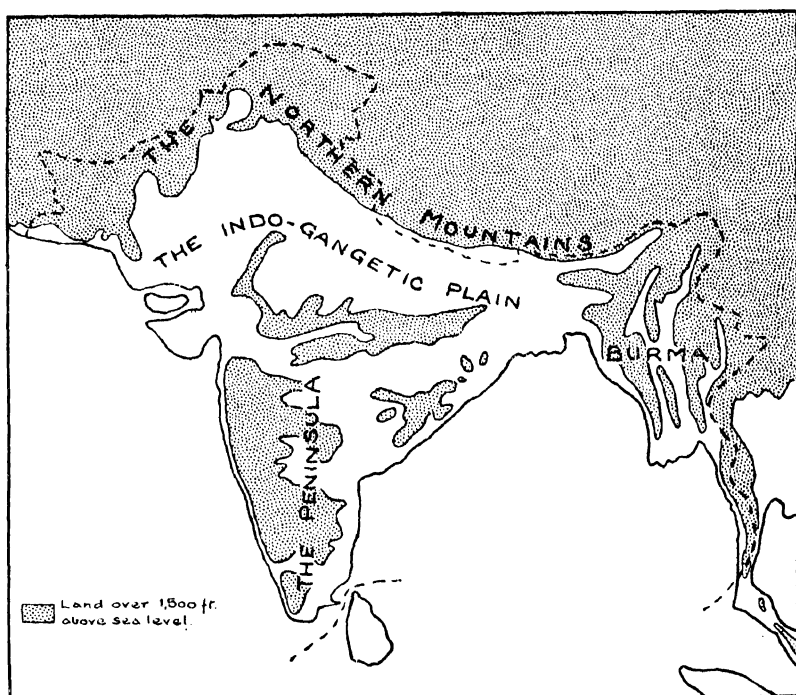


FIG. 28.—THE BROAD PHYSICAL DIVISIONS OF THE INDIAN EMPIRE.

extent, nearly as large as Europe, there will be a great diversity of surface features. The scenery varies from sun-baked plains and arid wastes to impenetrable forests and gleaming snow-capped mountains. Four well-marked physical regions may be distinguished: the Peninsula; the Indo-Gangetic Plain; the Northern Mountains; and Burma. (Fig. 28.)

The Peninsula.

The Peninsula consists chiefly of a large plateau known as the *Deccan*, which has an average height of about 2,000 feet and is, for the most part, a region of wide valleys and gentle slopes. This great triangular block is tilted from west to east, and its western edge, called the *Western Ghats*, rises steeply in a series of steps, or *ghats*, from the narrow west coast plain, forming a barrier to communication between the coast and the interior, access being possible to the uplands only through certain passes, of which the *Thalghat*, the *Bhorphat*, and the *Palghat* are the chief. The eastern edge, the *Eastern Ghats*, is lower and much broken by the deltas formed by the eastward flowing rivers, the chief of which are the *Mahanadi*, *Godaveri*, *Kistna*, *Penner*, and *Cauveri*. Only in the north of the plateau, where a coastal disturbance has changed the direction of slope, are there any long rivers flowing westwards, the *Narbada* and the *Tapti* being unique in this respect. From the northern edge of the plateau, however, several rivers flow northwards across the plain, notably the *Son* and *Chambal* tributaries of the Ganges. All the Deccan rivers flow in deep gorges, which they have cut in the tableland, and are consequently of little use either for transport or, on the plateau, for irrigation.

The general rolling character of the surface is relieved by a number of ridges running eastwards from the Western Ghats. These are highest in the south, where the *Nilgiri Hills* and the *Cardamom Hills*, separated by the low (1,000 feet) Palghat Pass, reach a height of nearly 9,000 feet. In the northern part of the Peninsula are the *Satpura Hills*, separating the Tapti and the Narbada rivers, and to the north of the Narbada are the *Vindhya Hills*. The only remaining range of importance is the *Aravali Hills*, situated in the extreme north-west, which, unlike the other ranges, extends in a north-south direction.

A great part of the Deccan is covered with poor, thin soil, but the river valleys are fertile and very productive. Also, in the north-west there is a large area of deep, rich, moisture-retaining soil, which, from its colour and the chief crop it produces, is known as "black cotton soil."

Between the Deccan and the sea are plains which vary in width from a few miles on the west to a hundred or two hundred miles on the south-east. The soil of these plains is very fertile, and the great heat and heavy rainfall combine to make them very productive.

The Western Ghats from Cape Comorin to Gujarat are covered with dense evergreen forests in which grow such valuable timber trees as *teak*, *ebony*, and *sandalwood*, and many palms and bamboos. Farther east the loftier parts of the Deccan are similarly forested, but elsewhere on the plateau the lower rainfall permits only of the existence of woods of deciduous trees

and of jungles of small trees and stretches of grass-land. In the Black Soil region trees are absent except along the streams, where mangoes and babuls grow. The vegetation of the east coast is much the same as that of the Deccan.

The Indo-Gangetic Plain.

The region between the Deccan on the south and the Himalayas in the north, and stretching almost without a break from eastern Bengal to the Afghan frontier, forms the great plain of the rivers *Indus* and *Ganges* and their tributaries. The soil has been washed down from the mountains, and its great fertility, combined with the ease of irrigation from both rivers and wells, has made this region the most densely populated part of the whole Indian Empire, containing almost half the enormous population of 319 millions. The rivers and irrigation canals, of which there are many, form useful means of transport, and the level nature of the country, which nowhere rises over 1,000 feet in height, has greatly facilitated the construction of railways. The roads, however, are poor, on account of the scarcity of road-making materials.

The Ganges rises on the southern face of the central Himalayas and receives many tributaries on its course across the plain to the Bay of Bengal. The largest is the *Jumna*, a right-bank tributary at whose junction with the Ganges *Allahabad* stands. Farther east, the *Gogra*, another Himalayan tributary, and the *Son*, flowing from the Deccan, join the river. The Ganges enters the Bay of Bengal through a delta equal in area to Ireland. The main channel, which for the last 500 miles of its course is fully a mile wide, is named the *Hooghly*. The *Brahmaputra*, flowing from Tibet, also forms a large delta, which unites with that of the Ganges on the east. The *Indus* rises near the source of the *Brahmaputra*, north of the Himalayas, and flows north-westwards through the mountains, finally turning south and cutting through to reach the plain near *Attock*. It receives many important tributaries from the Himalayas, and the land through which flow the five most important, the *Sutlej*, *Jhelum*, *Chenab*, *Ravi*, and *Bias* is named the *Punjab*, or "land of five rivers." The river enters the Arabian Sea through a large delta, and like the River Nile is bordered on either side by a narrow cultivated strip which owes its importance to irrigation and which merges into great arid tracts passing at times into true desert. Stretching away to the Aravali Hills is the *Thar*, or Indian Desert, many parts of which amply merit the title, but a large portion of which is populated and supports large herds of cattle, sheep, and camels.

"The aspect of this region varies from the arid, sun-baked plains of the Punjab to the reeking forests of Assam and the swamps of the Gangetic delta, but the general effect is that of

flatness, unbroken except where there is a sudden drop from the upland plain to the lower level near the streams.”¹

The Northern Mountains.

The great mountain ranges which cut India off from the rest of Asia form a mighty barrier more than 2,000 miles in length, of which over 1,250 miles are accounted for by the Himalayas, “the abode of snow,” which not only form a great barrier to communication with Tibet, but also act as a most important climatic barrier. The Himalayan scenery is unsurpassed for beauty, and the region contains several important health resorts, such as *Simla* and *Darjeeling*, to which those Europeans fortunate enough to be able to do so escape from the terrible heat of the plains during the hot weather.

The remainder of the region is composed of the complex mountain systems of the North-West Frontier and Baluchistan. These consist of high, arid ridges and isolated valleys, inhabited by warlike tribes which have constantly to be held in check by military force. The only relatively low passes of the northern mountains are situated here, the chief being the *Khyber Pass*, on the North-West Frontier, and the *Bolan Pass*, in Baluchistan. Through these the small trade with Afghanistan and Persia is carried on.

The lower slopes of the Himalayas, which experience heavy rains and great heat, are clothed in dense tropical forests. Higher up, however, the trees thin out, and from about 5,000 feet to 11,000 feet a mixture of coniferous and deciduous trees and shrubs such as rhododendrons are found. Above 11,000 feet the vegetation is of the Alpine type. The vegetation of the Himalayas becomes less luxuriant from east to west, though the general character is the same.

Burma.

Apart from the Shan States and the Tenasserim Province, Burma is practically identical with the drainage area of the *Irawadi* river. The country is one of parallel mountain ridges and valleys running in a general north-south direction, the Irawadi valley being much the most important region. This great river flows from the mountain mass in the north of the country through broad plains bordered on the west of its important tributary, the *Chindwin*, by the Naga, Manipur, and Chin Hills and, below the confluence of the two rivers, by the Arakan Yoma, which separates the valley from the coast. A glance at the map will show that, as far as communication by land is concerned, these great ranges of hills effectively isolate Burma from the rest of the Indian Empire. On the east the Kachin Hills and the Shan plateau separate the basin of the

¹ *The Oxford Survey of the British Empire*, vol. ii.

Irawadi from that of the *Salween*, the second great river of Burma. Farther south it is separated from the valley of the *Sittang*, a much smaller river, by the Pegu Yoma, and this, in turn, is separated from the Salween valley by a belt of uplands. On the east of the Salween valley the country is again mountainous.

Round the coasts and on the mountain slopes tropical forests are found, but in the centre of the country and in the river valleys there are areas of grass-land and deciduous trees.

CLIMATE

A country whose southern extremity stretches far into the torrid zone, whose northern boundary lies within the temperate zone, and which embraces great plains, plateaus, and mountain ranges, necessarily experiences great variations of climate. The climate as a whole, however, is *monsoonal* in type, and from this a certain unity results which enables a broad general description to be given. The year may be divided into two broad periods: the *dry* season from December to May, the period of the north-east monsoon; and the *wet* season from June to mid-December, the period of the south-west monsoon. The dry season may be further sub-divided into the *cold* weather—purely a relative term, for in the lowlands the temperature is always high—lasting from mid-December to the end of February, and the *hot* weather from March to mid-June.

During the hot weather the heat of the plains is almost unbearable, and it is this which causes the low atmospheric pressure conditions to be set up which cause the south-east trade winds to pass over the equator and reach India as the south-west monsoon. The monsoon arrives heavily charged with moisture, after its long passage over tropical seas, and its forced ascent of the Western Ghats, and the mountains of Burma and Assam cause a very heavy rainfall in these regions. (Fig. 29.) The Himalayas deflect the branch which passes over the Bay of Bengal up the Ganges valley as a south-east wind, and here, also, there is a heavy rainfall. The basins of the Indus and the Thar, however, experience a very low rainfall, owing chiefly to the fact that the northern limit of the main current of the monsoon is in the neighbourhood of the Gulf of Cambay, the winds blowing from the west having originated over Persia and Arabia, and that the branch which passes up the Ganges valley has deposited most of its moisture before reaching the region. With the passage of the sun to the south, after midsummer, the region of greatest heat, and therefore of lowest pressure, gradually moves south from the northern plains to the equator, and the wind direction begins to change. As a result of this the wet season can be sub-divided into (a) the rains, from June to September, when the monsoon is blowing *from* the south over most

of the country, and (b) the period of the retreating south-west monsoon, from October to mid-December, when the winds begin to curve back and blow *towards* the south. During this second period the south-east coast receives a plentiful rainfall while the remainder of the country is comparatively dry. By the middle of December the south-west monsoon has completely retreated and the *dry* north-east monsoon, blowing off the land, sets in.

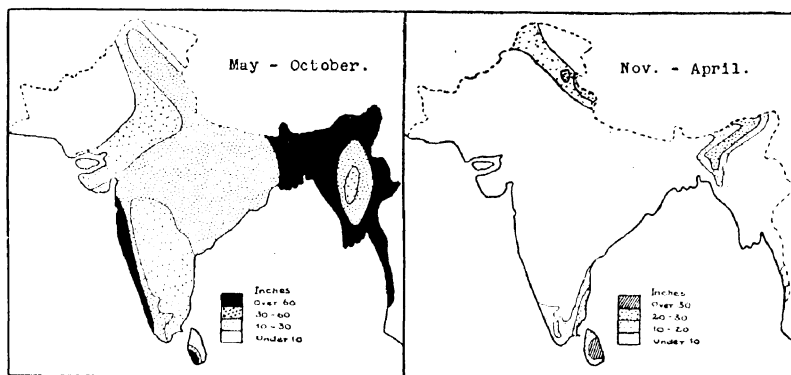


FIG. 29.—THE RAINFALL OF THE INDIAN EMPIRE AND CEYLON.

At this period the mountain barrier in the north prevents the bitterly cold winds of the interior of Asia from reaching India.

During the period of the retreating south-west monsoon conditions are favourable for the formation of tropical cyclones, particularly in the Bay of Bengal, and the coasts of Madras, Bengal, and Burma have suffered great material damage and much loss of life from this cause. The *temperate* cyclones, however, which travel slowly eastward over the Punjab and down the plains during the months December to March, are of very great value, for they provide an appreciable rainfall which enables the winter crops of wheat, barley, etc., to flourish.

INDUSTRIES DEPENDENT ON CLIMATE

By far the most important industry of India is *agriculture*, and the majority of the remaining industries are subsidiary to it. According to the 1921 census more than 229 millions of people are engaged on the land, about two-thirds of the total population being *directly* dependent on agriculture, as distinct from pastoral occupations and forestry.

Forestry.

Nearly a quarter of a million square miles of forests are under the direct control of the State Forest Department. Of this enormous area more than half is in Burma, which provides two-

thirds of the revenue derived from forests, and there are large areas, also, in Assam, the Central Provinces, Madras, Bombay, and Bengal. The most important timber obtained from the forests, *teak*, is specially important in Burma, where the trees are felled in large numbers and floated down the Irawadi to the great sawmills of Rangoon, from which port the timber is exported. Many other valuable woods are obtained, including *sal*, *ironwood*, *sandalwood*, *rosewood*, *ebony*, *oak*, and woods from many coniferous trees. In addition, *bamboo*, extensively used in building, furniture-making, and in the manufacture of almost every domestic utensil, is cut in large quantities, and *cutch*, a resin, and *myrobalans*, a fruit, both of which are used in tanning, are obtained.

Though timber forms a valuable export the amount shipped from Indian ports is insignificant when compared with the enormous quantities consumed locally, both by the great public works, such as railways and canals, and by individuals. "The people, in fact, to a greater or less extent, are dependent on the products of the forests for their domestic and agricultural requirements. The roofs of their houses are made of grass, palm-leaves, or shingles, and are supported by bamboos or wooden poles. Their ploughs and carts and other implements are of wood, their ropes of grass or fibre. Their oil- and rice-mills are of wood, and they use besides a thousand products of the jungle in barks, roots, fruit, and leaves in the daily routine of life. They fence their fields with thorns from the forest and manure them with green foliage or with wood-ashes."¹

The Pastoral Industry.

Bullocks are used throughout the country as draught animals, and the number of *cattle* is consequently very large, nearly 120½ millions. They are reared in the largest numbers in the Thar region where, except in favoured places, agriculture cannot be carried on successfully. As the Hindu religion prohibits the use of beef for food, *goats* are reared in large numbers, both for their flesh and milk. The number of *buffaloes*, also, is great, as, like oxen, they are widely used for draught purposes: they are especially important, however, in the wet lowlands of the Ganges valley, where they are used for ploughing the rice fields. Next, in order of numerical importance, are *sheep*, found chiefly on the Eastern Ghats and in Kashmir and the Punjab, and in the dry north-west, Rajputana, Sind, and the Punjab, considerable numbers of *horses*, *donkeys*, *mules*, and *camels* are reared, the trade across the North-West Frontier being carried on chiefly by camel train. In the high regions of the Himalayas, the *yak*, a kind of woolly bullock and a native of Tibet, is an important beast of burden.

¹ *The Oxford Survey of the British Empire*, vol. ii.

The very large number of domestic animals in India leads to an important export of *hides* and *skins*. *Wool*, also, is an important export, and from the *mohair* obtained from goats the famous Kashmir shawls are made.

Agriculture.

The great dependence of the country on agriculture is by no means an entirely favourable feature in the economy of India ; the enormous population is too much at the mercy of the south-west monsoon, a very uncertain feature. "The south-west monsoon is essentially the rain-giver of India, and the source of livelihood to millions of its inhabitants. It is estimated that 85 per cent. of the total rainfall is derived from it. But it must not be thought that it rains continuously. There are breaks, which are sometimes prolonged, and the total rainfall of the season may be reduced to such an extent that the crops fail and famine follows."¹ The record of famines from this cause is terrible, many millions having been starved to death during past years as a result of the failure of the rains. The work of the British Administration in the construction of irrigation works and of railways, by means of which supplies can be rushed to stricken areas, is one of the greatest benefits that have been conferred upon the country. Fortunately, the rains have never been known to fail over the whole of India at the same time. In any year the rainfall may be above or below the average over the whole country, but the effect of a deficiency is serious only in those regions where the normal rainfall is just sufficient for agriculture and where there is a large population dependent on the industry. Where the rains are normally deficient a lower rainfall than usual is of comparatively small importance ; likewise where the rainfall is normally heavy, deficiencies matter little. It is most serious in intermediate areas, such as Central Burma, the Deccan, and north-west and central India, especially the south Punjab, east Rajputana, and the United Provinces. However, quite apart from the necessity for the provision of irrigation works in these areas as an insurance against a failure of the rains, in many parts of the country cultivation would be impossible but for the supply of water in this way.

IRRIGATION.—At present three systems of irrigation are in use—wells, tanks, and canals. The wells are usually primitive and the result of individual initiative, whereas the great modern tanks and canals are the outcome of a scientific attempt on the part of the State to solve the problem.

Some 10,570,000 acres of land are irrigated from *wells*, most of which are found in the alluvial plains of the north and are of every description, varying from the temporary, or *kacha*, wells

¹ *The Climates of the Continents*, by W. G. Kendrew.

costing a few rupees to the masonry well which may cost thousands of rupees. The Government has afforded every assistance to promote the sinking of wells by individual cultivators, and so effective are they that in the Punjab each well may irrigate as much as 12 acres of land. In most cases the water is drawn to-day by the same methods as were used a thousand years ago. The water is raised in buckets attached to a pulley rope, the motive power being supplied by man, or by oxen driven down an incline away from the well.

The *tank* system, like well irrigation, has its origin far back in Indian history, and is used where canal irrigation is impracticable, either because the channels of the rivers are worn deep in the rock, or because the gradient is too small to permit of the irrigation of the plains below the mountains in which the rivers rise. The term "tank" signifies an extensive reservoir, in the nature of a vast artificial lake, formed in many cases from natural valleys closed by huge dams, or barrages. The tank system is used throughout nearly the whole of peninsular India, and has made possible the profitable cultivation of more than ten million acres of land which, but for irrigation, would be unfit for agriculture. In the not far distant future the area will be much increased. The construction of great modern tanks has involved the building of dams with some of which the famous Aswan Dam on the Nile can scarcely be compared. The dam built for the Periyar Irrigation Works in the Madras Presidency is the highest in the world, being 178 feet above the river bed, whilst the tank thus formed can contain 13,300 million cubic feet of water and supplies an area of 1,200 square miles in the Madura district. Three great irrigation schemes of first importance are at present in various stages of progress. These are the Sarda scheme in the United Provinces, the Sutlej Valley project in the Punjab, which will irrigate an immense tract to the south-west of Ferozepore and in the Native States of Bahawalpur and Bikaner, and the great Sukkur Barrage and Canals project, the largest scheme of its kind in the world. This immense dam, which is being constructed to regulate the waters of the great River Indus, will create a store of water sufficient to irrigate nearly 6,000,000 acres of what is now barren land—an area 500,000 acres larger than the whole of cultivated Egypt! The conversion of this great arid tract into a fertile land producing immense quantities of wheat, cotton, rice, and oil-seeds will have far-reaching effects on the port of Karachi, the outlet of the region.

By far the most extensive irrigation works in India, however, are of the *canal* type. The canals are often wider and deeper than the Thames, and are found everywhere throughout the plains of Northern India, serving a total area of 23,624,000 acres. Many of them, such as the Ganges Canal, are of great extent. This canal, for example, with its distributing channels, has a total length of nearly 10,000 miles and irrigates an area of

no less than 1,700,000 acres. There are two main classes of canal in use : *perennial canals*, which, as the name implies, draw supplies from rivers throughout the year ; and *inundation canals*, which convey water only during flood periods. Before the development of the railway system the former were of additional value for navigation purposes, but they are now little used as a means of transport.

It is difficult to estimate the importance to India of this question of irrigation. It has done, and is doing, much to alleviate the famine scourge ; it enables the country to support its enormous population ; it makes possible a great future for India as a cotton- and grain-producing country ; and finally it provides the Government with a steady and increasing source of revenue.

The chief crops grown are as follows :—

RICE is the most important crop, both as regards the area sown and the total yield. It is not only the chief food grain of the people, but is an important export (chiefly from *Burma*, where the population is comparatively thin) coming next in order after jute and cotton. It is cultivated in the wet, hot lowlands, where not only is the rainfall heavy, but the fields can easily be flooded. The chief regions are the Ganges valley and delta, the coastal plains of the Peninsula, the irrigated areas of Sind, and the river valleys and deltas of Burma.

MILLET, the next most extensively grown crop, is cultivated as a food crop throughout the higher parts of the plains and in the Deccan.

WHEAT is grown extensively in the comparatively dry and cool regions of the north, chiefly in the *Punjab* and the *United Provinces*. It is grown as a *winter* crop, being sown at the end of the summer rains, and harvested between January and March. The great collecting centre for the wheat grown in the Punjab is *Multan*, and the chief port of export, *Karachi*. Much of the wheat grown in the United Provinces, however, is sent to Calcutta for export. Wheat is grown also on the irrigated areas and the moisture-retaining soil of the north-west Deccan, the port of shipment in this case being Bombay.

COTTON occupies the next largest area, but it is the first crop as regards commercial importance. It is grown chiefly on the black soil of the northern Deccan, and in the upper Ganges and Indus valleys. The quality of the Indian cotton is unfortunately poor, the staple being short and coarse, and for this reason it is relatively little used in the Lancashire mills, though it is much in demand in China and Japan. Thanks to the activities of the Indian Cotton Growers' Association, however, the quality is gradually being improved. The region that shows most promise of producing the better qualities is Sind, where it has been proved

that Egyptian and American varieties can be cultivated with success. *Bombay* is at present the most important cotton port, but the importance of *Karachi* in this respect is growing, and will be greatly increased when the Sukkur barrage is completed. *Madras*, also, has a share in the trade.

OIL-SEEDS, including linseed, rape, mustard, and sesamum, rank fifth as regards acreage. They are widely cultivated and are important both for domestic consumption—for food and the supply of oil—and for export. With oil-seeds may be included *ground nuts*, which are being cultivated on an increasingly large scale, and are chiefly important as a source of oil.

JUTE occupies a comparatively small area, but, like cotton, has a commercial importance out of all proportion to its acreage. India has a monopoly in the production of jute, and the combined value of the raw material and manufactures, chiefly gunny bags, places the crop second only to cotton in the list of exports. Its cultivation is restricted to the neighbourhood of the Ganges delta, where the great heat, alluvial soil and flooding suit its growth to perfection, and the great jute port is *Calcutta*.

SUGAR-CANE requires, like rice and jute, abundant heat and moisture, and is grown chiefly in the lower Ganges valley. Though the yield is great it is insufficient for local needs, and large quantities of sugar have to be imported.

TEA is like jute in that its cultivation is limited to very restricted areas. Over half the acreage is on the mountain slopes in Assam, and a quarter round Darjeeling on the slopes of the Himalayas. Much smaller quantities are grown on the Nilgiri Hills. The conditions, both physical and human, combine to make India the greatest tea-growing country in the world.

COFFEE is grown chiefly in the Nilgiris.

INDIGO is still grown fairly extensively in the Ganges valley and on the east coast, round Madras, but the cultivation of the plant has been severely hit by the increasing use of synthetic dye produced from coal-tar.

OTHER CROPS include *opium*, grown chiefly between Allahabad and Patna ; *cinchona*, cultivated for its bark, from which quinine is obtained, and as a protection for the tea plantations, on the Himalayas and the Nilgiris ; *spices*, grown chiefly on the west coast plain ; *rubber*, cultivated in the Andaman Islands ; *coco-nuts*, which flourish on the coasts and give rise to a small export of copra ; and *tobacco*, widely grown throughout the country.

MINERALS

Compared with agriculture mining is of but small importance, for the economic structure of India as a whole is that of a mediæval country on the brink of the modern stage, and just as the mineral resources of Britain were scarcely touched before the industrial Revolution so the resources of India in such minerals as coal, iron, and manganese, have lain almost undisturbed up to modern times. While the manufactures were carried on by the people in their homes—as they still are to a great extent—there was little incentive to develop the resources of the country in those raw materials required only on a large scale by the modern factory—coal for power and iron for machinery. Lack of knowledge, inadequate means of communication, and the difficulty of obtaining any adequate supply of capital for industrial purposes, also, were important limiting factors. A change is, however, taking place with the expansion of the modern transport system, the development of banking, and the spread of the knowledge of British industrial methods. The growing industrialisation has caused a great and increasing demand for raw materials of all kinds, and, consequently, the resources of the country are being more fully developed.

COAL is being mined in increasing quantities, and nearly 21 million tons were produced in 1925 as compared with 6½ million tons in 1901. More than a quarter of the total output is obtained from the *Bihar and Orissa* fields at Jherria, Raniganj, Bokaro, and Giridih. Second in importance are the Singareni mines in *Hyderabad*, and other fields have been opened up in the Central Provinces, Rewar, Assam, Baluchistan, Kashmir, Rajputana, and Upper Burma.

The output is more than sufficient for the existing requirements of the railways and the smelting and manufacturing industries, but the quality of the coal is, unfortunately, not very good, and considerable quantities are imported from Natal.

IRON ORE is widely distributed but, at present, only those deposits are worked which are found in the neighbourhood of coal supplies. This is especially the case in the north-east of the Deccan.

PETROLEUM ranks after coal in the value of the production. By far the most important fields are those of the Irawadi valley, in Burma, the chief centres being Yenangyaung, Singu, and Yenangyat, only very small quantities being obtained in Assam and the Punjab. The great oil-refineries of *Rangoon* are fed by pipe-line and tank steamers.

MANGANESE ORE, of which India is one of the world's chief

sources of supply, is mined in several parts of the Deccan, but chiefly near Nagpur, in the Central Provinces.

GOLD, next in value, is mined in Mysore, in the Kolar district, and in the Western Ghats, near the Nilgiri Hills.

LEAD is obtained chiefly from the mines of the Burma Corporation Ltd., in the North Shan States, from which are also obtained considerable quantities of SILVER and ZINC.

MICA, another mineral in the production of which India is one of the leading countries, is mined chiefly in northern Bengal.

SALT ranks, by value, as the sixth most important mineral produced in India, but it is of the greatest importance in a hot country. It is obtained chiefly by evaporation of sea water in the coastal districts, notably in the Rann of Cutch, but in the Salt Range of the Punjab it is obtained by mining.

TIN ORE is mined in the Tenasserim area of southern Burma, where extensive deposits exist.

OTHER MINERALS produced in smaller quantities include *copper, tungsten, chromite, magnesite, and precious stones.*

MANUFACTURES

During the past fifty years or so, but chiefly since the commencement of the present century, a great economic transition has been taking place in India, and though methods which have been employed for many centuries still hold sway over the country generally, by far the greatest number of people being employed in the old hand industries, modern industrial methods are gaining ground and the factory system is spreading. At present, of the 33 million people supported by manufacturing industries, nearly one-and-a-half millions are employed in factories; jute mills, cotton mills, and railway and tramway workshops account for about two-thirds. Other manufacturing industries employing considerable numbers are tea factories, rice mills, foundries, engineering workshops, printing works, dockyards, and shipbuilding.

COTTON MILLS employ the largest numbers of industrial workers. In 1924 there were 275 cotton spinning and weaving mills, employing 324,600 persons, and 1,750 ginning and pressing factories, employing 133,100 persons. The great centre of the industry is *Bombay*, where not only is the raw material close at hand on the Deccan, but the rapid streams of the Western Ghats provide plentiful hydro-electric power and there is an ample supply of cheap labour. The climate is sufficiently humid during the wet season, but during the remainder of the year

the air in the mills has to be kept moist by artificial means. *Ahmadabad*, in Gujarat, ranks second as a cotton centre.

JUTE MILLS, of which there were 90, in 1924, employing 339,500 persons, are centred chiefly at Howrah, a suburb of *Calcutta*, the natural centre of the industry. The great jute-producing area of the Ganges delta, the Sundarbans, is close at hand; coal is found in plenty in the Bihar and Orissa fields nearby; and cheap labour is abundant. The mills manufacture large quantities of the coarse cloth from which gunny bags are made, which are exported in large numbers to countries bordering the Indian and Pacific oceans as well as being used for packing Indian produce for export. Jute cleaning and pressing mills also employ considerable numbers.

Apart from these modern machine industries, however, the hand-loom textile industries give employment to some 11,000,000 people, and the muslins and damasks of northern India, the calicoes and chintzes of the south, the silks of Gujarat, Benares, Amritsar, and Mandalay, and the carpets of Amritsar have long been famous Indian products. They are still much in demand, but the products of the native metal-worker are unfortunately of little economic importance to-day, the competition of the factory product being very severe.

RAILWAY AND TRAMWAY WORKSHOPS employ considerable numbers. In 1924 there were 114 workshops employing 141,800 persons, and these numbers are likely to be increased with the development of the iron and steel industry. At present most of the railway and tramway materials are imported, the chief function of the workshops being that of repairing.

THE IRON AND STEEL INDUSTRY, though still of comparatively small dimensions, is gradually expanding. The only two large firms at present engaged in the industry use the coal and iron of the Bihar-Bengal region, the more important being the Tata Iron and Steel Works at Sakchi (Jamshedpur), producing pig-iron, steel rails, and steel plates. The following extracts from the conclusions of the Indian Tariff Board regarding the iron and steel industry are worthy of note :—

“ India possesses a great natural advantage for the manufacture of steel owing to the richness and abundance of the iron ore deposits and the comparatively short distance which separates them from the coalfields.

“ The quantities of coking coal available are sufficient for the requirements of the industry for a century or more unless its growth is unexpectedly rapid, and the supplies of limestone and dolomite are ample. These materials are not equal in quality to those available in some other countries, but they are good enough for their purpose and are not more expensive than elsewhere.

“ Most of the other raw materials required, and also the materials for refractory bricks, exist in India in sufficient quantities.

“ The Indian market for steel is already large and is likely to grow. In

respect of labour India is at present at a disadvantage, which will be removed as the workers acquire skill and experience.

"India already produces pig-iron more cheaply than other countries, and the possibility of producing steel of thoroughly sound quality has been proved. It has not hitherto been found possible, however, to combine a high output with satisfactory quality. As soon as this has been done the future of the Indian steel industry is assured."

OTHER INDUSTRIES.—In addition to these industries there are numerous *flour mills* in the Punjab; *rice, saw and oil mills*, in Burma and elsewhere; *tea factories*, chiefly in Assam; *sugar factories, silk mills*, and *indigo factories*, chiefly in Bengal; *petroleum refineries*, in Burma; *engineering shops* at Calcutta and Howrah; *tanneries and leather works* at Cawnpore, Bombay, and Madras; *printing works*, chiefly in Bengal and Madras; as well as *tile and brick factories*, chiefly in the Ganges valley.

POPULATION AND INLAND TOWNS

The Indian Empire has a population of nearly 319 millions, being, after China, the most populous region in the world and having within its boundaries about three-quarters of the total population of the British Empire. Although densely populated, however, it is by no means over-populated, for two-thirds of the people live on one quarter of the area, and in regions such as Burma and Assam a much larger population could be supported. Again, the population is rural rather than urban, for, apart from the fact that plague is prevalent in the towns, the people do not prefer town life.

As is to be expected from the great extent of the Indian Empire, its inhabitants are far from forming one nation or people. They differ very widely in blood, physique, character, language, and religion. There are, indeed, some 60 different nationalities, divided into 2,500 tribes or castes, speaking about 180 languages, and the religions are almost as numerous and diversified.

The primitive inhabitants are the *Dravidians*, of short stature, dark complexion and eyes, plentiful hair, and broad nose, who are found throughout peninsular India, and form the population of Madras, Hyderabad, the Central Provinces, most of Central India, and Chota Nagpur. The pure Dravidian is an excellent labourer and may be found on the tea plantations, in the rice fields, or doing scavenger's work in the streets of the large towns. In the north-west this race has been displaced by successive hordes of Aryans, Scythians, Pathans, and Mongols, who have inter-mixed with the original inhabitants. *Aryans* have occupied the Punjab, Rajputana, Kashmir, and the United Provinces, while *Mongolians* have inter-mixed with the natives of Bengal, Nepal, Assam, and Burma. The people resulting from the

infusion of these two races are of a higher type than the Dravidian, and their members have procured higher grades of employment.

Of the many religions *Hinduism* stands foremost and is the religion of over two-thirds of the total population of India. It covers a mass of beliefs and social customs of the tribes who adopt it, and is made up of innumerable sects and cults. With these people the caste system is very rigid, in some cases members of a lower caste may not approach within 72 feet of a member of a higher caste and must herald his approach with loud shouts. *Buddhism*, the religion of Burma, and *Jainism*, both originally sects of Hinduism, guide the spiritual needs of another 5 per cent. of the population, while the rest are comprised of Parsees, Sikhs, Mohammedans, Christians, and Jews.

Though the average density of the population for the whole of India is 177 persons to the square mile, there are few large towns. Village life is still predominant, and, in the northern plains particularly, the villages are almost countless. There are only 89 towns with a population of over 50,000 and, even counting as towns any with more than 5,000 inhabitants, the urban population forms only about one-tenth of the total. The following are the most important inland towns, in decreasing order of population.

HYDERABAD, the capital of the state of that name, in the heart of the Deccan, the largest and most populous of the Indian states, is the fourth largest town of the whole of India, ranking after the great ports of Bombay, Calcutta, and Madras. The native ruler's title gives the state its name of "the Nizam's Dominions." The city is situated in a very fertile district producing millet, rice, wheat, oil-seeds, cotton, tobacco, and sugar-cane, and is connected by railway with Bombay, Calcutta and Madras.

DELHI, the ancient capital of the great Mogul Empire and now the modern capital of India, is the second largest inland town. It has a central position in the narrowest part of the fertile and thickly peopled northern plains, commanding the route between the Punjab and the Ganges valley, is about the same distance from Bombay and Calcutta, and has excellent railway communications with all parts of the country. The River Jumna, on which the town is situated, provides an easy means of irrigation for the surrounding country, and, with the many roads, an additional means of communication.

LAHORE, the third largest inland town, is the capital and most central town of the great wheat and cotton producing province of the Punjab.

AHMADABAD is second among the cities of the province of Bombay and the fourth largest inland town. It is situated 50 miles north-east of the Gulf of Cambay, on the Bombay, Baroda,

and Central Indian Railway, and is an important cotton manufacturing town.

LUCKNOW, the historic capital of the province of Oudh, is a busy commercial town having many native industries. It is situated on the river Gumti, a tributary of the Ganges, about 42 miles north-east of Cawnpore, and is an important railway junction with extensive railway workshops. It is also a great military centre.

CAWNPORE, a city of the United Provinces, is situated on the Ganges and is an important town on the East Indian Railway. It is a great commercial centre, and, besides manufacturing cotton goods, is one of the greatest leather manufacturing towns in the world.

POONA, situated on the Great Indian Peninsula Railway about 120 miles south-east of Bombay, where the line emerges from the Bhorghat, is the great military centre of the Deccan and the summer capital of the Bombay Presidency.

BENARES, the most sacred city of the Hindus, is one of the chief towns of northern India. It is situated on the Ganges, 420 miles from Calcutta, and has many native industries, its brass-ware, gold-cloth, and lacquered toys being famous.

AGRA, a city of the United Provinces, is situated on the Jumna about 140 miles south-east of Delhi. It has many claims to be regarded as the commercial capital of the North-West, and is an important railway centre on the East Indian Railway. Of its many famous buildings perhaps the most noted is the white marble Taj Mahal, one of the most beautiful buildings in the world, built by the Emperor Shah Jehan as a memorial tomb for himself and his favourite wife.

AMRITSAR, an important city of the Punjab, 32 miles by rail east of Lahore, is the religious metropolis of the Sikhs. Its native industries include the manufacture of Kashmir shawls, cottons, and silks.

ALLAHABAD, situated in the fork made by the Jumna and the Ganges, is the seat of government of the United Provinces. It is a very important railway junction and a great commercial centre, the cotton, sugar, and indigo grown in the surrounding district being brought into the city in large quantities.

MANDALAY, the chief town of Upper Burma, situated near the left bank of the Irawadi, where that river makes its great bend, is an important collecting centre for rice and teak. Its native industries are silk-weaving, ivory- and wood-carving, gold and silver work, bell and gong casting and knife and sword making, and it is the chief centre of the Buddhist faith in India.

SRINAGAR, the capital of the native state of Kashmir, has a most beautiful situation in the vale of that name on the River Jhelum. It is noted for the manufacture of Kashmir shawls.

COMMUNICATIONS

The record of the economic development of India is intimately connected with that of *railway* expansion, for not only are the railways invaluable for military purposes and in times of famine, but, by their daily service in the transportation of commodities, they have revealed to India the great value of her products and the need for their greater development. Although there are so many great rivers, water carriage is to-day comparatively insignificant. Throughout peninsular India not one river is navigable for any considerable distance, and even in the north, the great rivers Ganges and Indus and their tributaries are utilised to but a small extent, now that their valleys contain a network of railway lines, in spite of the fact that they are navigable for great distances. The *Ganges* and its tributaries the *Jumna* and *Gogra* can be used by small vessels as far as the Himalayas, as can also the *Indus*, and the *Brahmaputra* is navigable almost to the borders of Assam. But it is only in the Ganges delta and along the Brahmaputra and the Irawadi that a large commerce is still carried on by river. The *Irawadi*, indeed, is an exception, for it is the principal highway of Burma and is navigated by river steamers as far as Bhamo, over 900 miles from the sea.

The great irrigation *canals* are used to a certain extent for navigation by barges, but, like the rivers, they are of comparatively small economic value as means of transport. The *roads*, which spread in a network over the whole country, are of value mainly as feeders for the railways.

Railways.

The railways were originally constructed for military purposes, and are owned or controlled by the Government. Their total length is over 38,500 miles, but, unfortunately, four gauges are in use: the standard gauge (5 feet 6 inches), the metre gauge, and the special gauges of 2 feet 6 inches and 2 feet, and this is a hindrance to the interchange of traffic between one system and another (*cf.* Australia). Of the standard gauge, there are 18,932 miles of line; of the metre gauge, 15,873 miles; and of the special gauges, 3,774 miles.

The chief lines are as follows (Fig. 30):—

THE GREAT INDIAN PENINSULA RAILWAY has two main lines serving the Deccan. One crosses the Western Ghats by the Thalghat and runs *via* the valleys of the Tapti and Nerbada to

Jubbulpore; a branch of this line breaks off at *Bhusawal* and runs to *Nagpur*. The second crosses the Ghats by the *Bhorghat* and runs south-east *via Poona* and *Sholapur* to *Raichur*.

THE EAST INDIAN RAILWAY joins the first of the G.I.P.R. routes at *Jubbulpore* with *Allahabad*, whence it serves the Ganges valley. It passes south *via Benares* and *Patna* to *Calcutta*

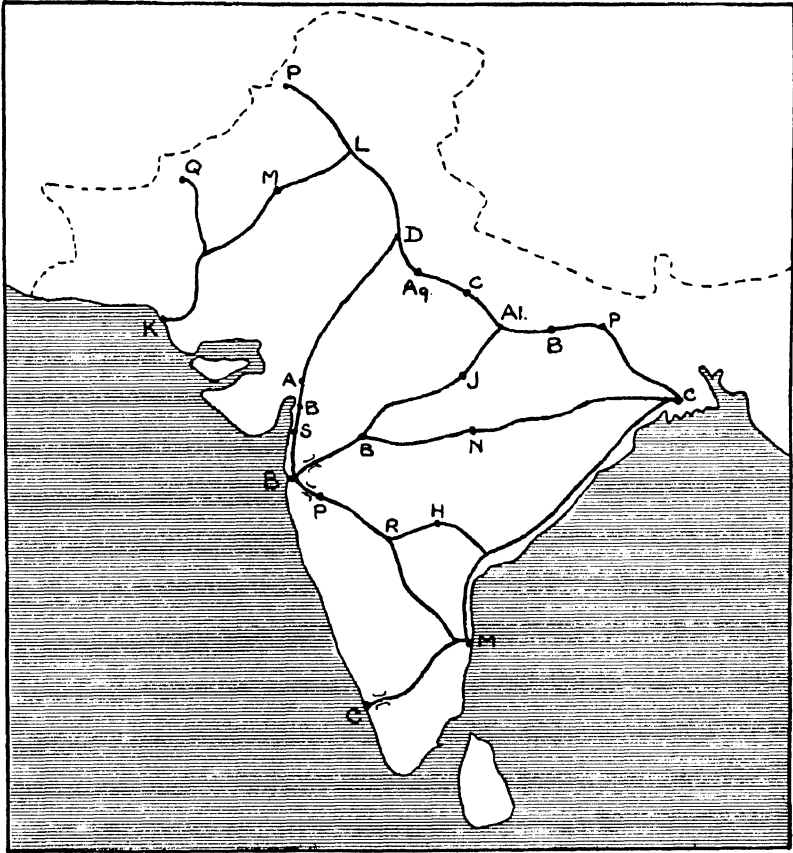


FIG. 30.—THE PRINCIPAL RAILWAYS OF INDIA.

(*Howrah*), and north *via Cawnpore*, *Agra*, and *Delhi* to *Ambala*, in the Punjab.

THE BENGAL-NAGPUR RAILWAY connects *Nagpur* with *Calcutta*.

THE MADRAS AND SOUTH MAHRATTA RAILWAY connects the second of the G.I.P.R. routes at *Raichur* with *Madras*, and has a line running across the Peninsula and reaching *Calicut* by the

Palghat. An important line follows the east coast, linking Madras and *Calcutta*. This system serves the greater part of southern India.

THE BOMBAY, BARODA, AND CENTRAL INDIAN RAILWAY connects *Bombay* with *Delhi*, via *Surat*, *Baroda*, *Ahmadabad*, and *Jodhpur*.

THE NORTH-WESTERN RAILWAY extends the E.I.R. route across the Punjab to the North-West Frontier at *Peshawar* via *Amritsar*, *Lahore*, and *Rawal Pindi*. It has an important line running from *Lahore* via *Multan* to *Karachi*.

The chief BURMESE RAILWAYS run from *Rangoon*. One follows the Irawadi valley as far as *Prome*; the other runs north via the Sittang, entering the Irawadi valley at *Mandalay*, whence lines run north to *Myitkyina* and north-east to *Lashio*.

COMMERCE AND PORTS

The foreign commerce of India is extensive, India ranking sixth among the commercial nations of the world. It is chiefly sea-borne, for not only are the land frontiers difficult to traverse, but the neighbouring countries are only thinly peopled. The predominant position of agriculture is clearly indicated in the foreign trade, over three-quarters of the exports being of agricultural origin, and, in spite of her immense population, India exports large quantities of *food-stuffs*, chiefly *rice* and *wheat*, and *tea*. Of these, the wheat and tea find their chief markets in Great Britain, but the rice is sent to many parts of both Europe and Asia. Large quantities of *raw materials*, principally *cotton*, *jute*, *oil-seeds*, *hides and skins*, *wool*, and *teak*, are exported, mainly to the countries of Europe, though the greater part of the cotton is taken by Japan. Of the manufactures exported, the chief are *cotton goods*, *jute goods*, and *opium*. Cotton goods find a ready market in the countries of the East and jute goods (gunny cloth and bags) are in demand in countries such as Australia, Canada, the United States, and Egypt, which have large quantities of grain, sugar, or cotton to export.

Of the *imports*, over three-quarters are *manufactured goods*, chiefly *cotton goods*, *hardware*, and *machinery*, derived mainly from Great Britain. The bulk of the remainder consists of *food-stuffs*, notably *sugar* obtained from Java, Mauritius, and the European beet-growing countries.

The bulk of the foreign commerce of India is carried on with Europe, especially with Great Britain, but it is steadily increasing with Japan, the United States, the Dutch East Indies, and Australia. The total trade is of immense proportions and, as almost all the exports and imports are consigned by sea, it will

be realised that the ports play an exceedingly important part in the economic life of the country.

India has very few naturally good harbours, and the chief ports are only five in number. *Calcutta* and *Bombay*, the two great entrepôts on which the railways converge, share the bulk of the trade, the former handling about a third and the latter about a quarter of the total, and most of the remainder is shared, in order, by *Karachi*, *Rangoon*, and *Madras*.

CALCUTTA is situated about 80 miles from the sea, on the Hooghly, the chief arm of the Ganges delta. It has a poor harbour, for large quantities of silt are brought down by the river, and the port is kept open only by constant dredging; moreover, the Hooghly has a dangerous bore and is difficult to navigate. The port has great advantages, however, in comparison with which these disadvantages are of little consequence. It has a large, densely populated and very productive hinterland, with which it has excellent communications by rail, road, river, and canal; it has practically a monopoly of the trade in *jute* and *tea*; and there are plentiful supplies of coal available for shipping.

BOMBAY, "the western gateway to India," has by far the finest harbour of the country, indeed, one of the finest natural shelters in the world. The town is on a small island 11 miles long by 3 miles broad, and development and extension are thus restricted, but causeways and breakwaters connecting with the mainland make its situation peninsular rather than insular. The island and the breakwaters protect the harbour from the south-west monsoon in summer, and in winter, when the winds are blowing from the north-east, the Western Ghats have a similar effect, and the harbour is thus safe for large ocean-going vessels at all seasons and in all weathers. Bombay has, therefore, a big advantage over Calcutta as far as its harbour is concerned. But it has not the *natural* advantages possessed by that port in other ways, and its great modern importance is largely the result of railway development. (Fig. 31.) The hinterland of the port was at one time restricted, by the Western Ghats, to the narrow coastal plain, but the construction of the lines of the Great Indian Peninsula Railway, serving the Deccan and joining up with the eastern railway systems, and the Bombay, Baroda, and Central Indian Railway, connecting with the railways in the north, has brought within its hinterland the great cotton-growing black soil region and the fertile upper Ganges valley, thus making it the first *cotton* port of India. The opening of the Suez Canal, in 1869, gave the port an immense advantage over its great rival by placing it about 2,000 miles nearer than Calcutta to Europe, and it has gradually increased in importance. Bombay, alone of the Indian ports, has extensive docks, it is the greatest industrial centre of the country, with a large export of

cotton goods from its factories, and it seems probable that it will one day rank as the first port of India.

KARACHI, situated on a small bay to the west of the mouths of the Indus, has a fine natural harbour which is constantly being improved to keep pace with the development of the port, and is even less affected by the south-west monsoon than is Bombay. Its hinterland extends from eastern Persia to the western districts of the United Provinces and includes the fertile Punjab, with

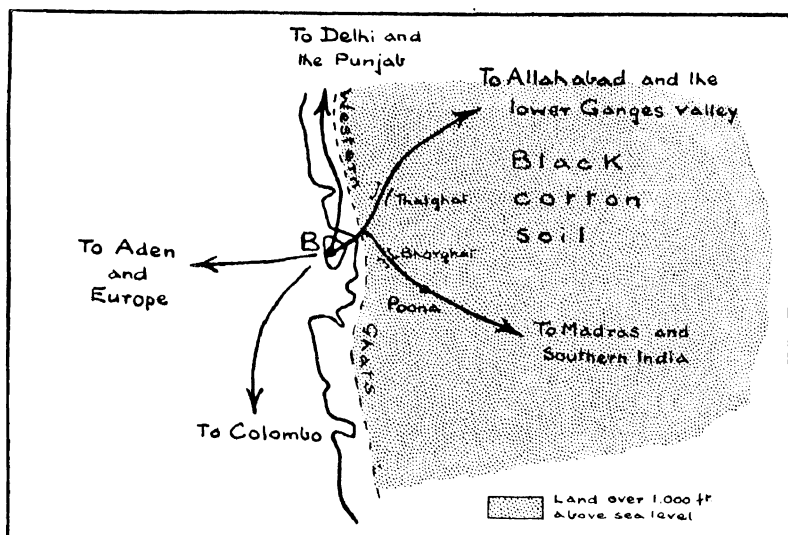


FIG. 31.—THE POSITION OF BOMBAY.

which it is connected by the North-Western Railway, and it is the first *wheat* port and the second *cotton* port of India. The great irrigation schemes which are being carried out on the Indus and the Sutlej will, when completed, greatly increase its importance. "When it is considered that the whole of the exportable surplus of the lands brought into cultivation under both the Sutlej Valley and the Sukkur Schemes will find its natural outlet through the harbour of Karachi, some idea may be formed of the great future which lies before this progressive port. Even now, Karachi ranks as one of the five great ports of India, and is the entrepôt for the produce of the Punjab, Sind, Afghanistan, Baluchistan, and also large tracts of Rajputana, and even portions of the United Provinces. Owing to the lower port charges and facilities for rapid clearance of goods, there has been a distinct tendency during the past year for the Delhi market to import its piece-goods and other imports through Karachi rather than *via* Bombay, and this tendency will probably be accentuated when the new Karachi harbour works are com-

pleted.”¹ In addition to its great value as a seaport, however, Karachi will soon be in regular touch with Europe by air, and, in the future, it may well become the great air-port of India.

RANGOON, the chief port of Burma, is situated on the Rangoon River, an arm of the Irawadi delta, which, however, has connection with the Irawadi only during the wet season. It has rail connection with the lower Irawadi valley at Prome and with the upper Irawadi valley at Mandalay. Rangoon is the chief Indian port handling *rice* and *teak*, and is important, also, in connection with the export of *tin ore* and *petroleum*.

MADRAS is greatly handicapped as a port by its having no natural harbour. It offers but poor accommodation for large vessels, and is a dangerous harbourage during part of the north-east monsoon. It lies, however, at the eastern end of the railway line from Calicut *via* the Palghat and has a densely peopled and very productive hinterland. Hides and skins, raw cotton, and Indian piece-goods are among its chief exports.

ADEN AND ITS DEPENDENCIES

ADEN, “the Gibraltar of the East,” is a British fortress on a volcanic peninsula of the Arabian coast, about 100 miles east of the Strait of Bab-el-Mandeb. The settlement includes a second peninsula, Little Aden, and between the two peninsulas and the mainland is a bay 9 miles across and 3 to 4 miles in length, the centre of which, forming the outer harbour of Aden, is sufficiently deep to take the largest ships. Its good harbour and important position at the converging point of routes to the Red Sea and Suez Canal from India, Ceylon, Australia, and the east coast of Africa account for its value to the British Empire. It is an important coaling and oil-fuelling station, and, in view of its great strategic value, is strongly fortified. The climate is hot and dry and there are no local products. There is, however, a considerable entrepôt trade.

Attached to Aden for administrative purposes are the *Aden Protectorate*, on the mainland; the island of *Perim*, an important cable and coaling and oil-fuelling station, with a good harbour, in the middle of the Strait of Bab-el-Mandeb; *Sokotra*, an island off the north-east coast of Africa, producing dates and various gums; and the *Kuria Maria Islands*, off the coast of Arabia, which were ceded by the Sultan of Maskat for the purpose of landing the Red Sea cable.

Aden is administered by a Political Resident, and is subject to the Bombay Government.

¹ Department of Overseas Trade Report on India for 1924.

THE BAHREIN ISLANDS

These islands form a group of five in the Persian Gulf, 20 miles off the coast of Arabia. They are the centre of the important *pearl* fisheries of the Gulf, over 1,000 sailing boats of various sizes being engaged in the industry, and produce *dates* and a fine breed of white donkeys. The importance of the islands to the British Empire is chiefly strategic, however, for they provide the key to the control of the Persian Gulf, the head of which was, until the establishment of the Kingdom of Iraq under British mandate, the weak spot in our defences round the Indian Ocean.

The Bahrein Islands are a British Protectorate, the native ruler being in Treaty Relations with the Government of India, who are represented by a Political Agent.

CHAPTER X

CEYLON, BRITISH MALAYA, AND OTHER ASIATIC POSSESSIONS

CEYLON

CEYLON, though geographically a part of India, is politically independent of its great neighbour, and is the largest and one of the most prosperous of the British Crown Colonies. It is an island in the Indian Ocean lying off the south-eastern extremity of India, and is separated from the mainland by the Gulf of Manar and Palk Strait, a channel, varying from 32 to 120 miles broad, which is crossed by Adam's Bridge. This chain of small islands and sand shoals carries a railway viaduct and effectively prevents any but small vessels from sailing round the west coast. Ceylon has an area of 25,332 square miles, about half that of England, but its population is only $4\frac{1}{2}$ millions, or about three-fifths that of London.

The chief elements in the population are native *Sinhalese*, numbering over 3 millions, and *Tamil* settlers from Southern India, who number over a million and supply most of the coolie labour required on the plantations and in the towns. There are, too, people descended from many European and Asiatic races which have become, to differing extents, intermixed through marriage. Most notable among these are the Burghers, descendants of the Dutch settlers who held possession until the island was annexed by the British in 1796, and who, though few in number, are of some social and economic importance as they occupy posts of minor importance in the government and are members of the legal and medical professions.

Physical Features and Climate.

About four-fifths of the island is covered by gently undulating plains, with a mountain zone rising to between 6,000 and 8,000 feet above sea-level in the central south, where the lowland regions are limited to narrow coastal plains. In this mountain region rise many rivers, the chief of which, the Mahavila-ganga, drains an area of over 4,000 square miles, but all are too swift to be of much use for navigation, though they are capable of providing abundant water power.

Ceylon shares the monsoonal climate of India, but its insular situation gives it a great advantage over the mainland, the temperature being much more equable. The varying altitude, however, obviates uniformity of climate throughout the island. On the coastal plains it is always hot, for the island lies between latitudes 6° N. and 10° N., but strong sea breezes prevent the climate from becoming enervating or unhealthy, while in the interior, distance from the ocean is more than compensated for by the elevation of the land. On the beautiful plateau of Nuwara-Eliya the average temperature is 62° F., and the nights are cool and refreshing. Here the various hill stations, which are easily reached by road and rail from all parts of the island, form valuable sanatoria. The south-west and north-east monsoons sweep over the island, each for approximately half the year, and, unlike India, Ceylon receives rain from *both* (see Fig. 29), for the north-east monsoon, while dry in India, has crossed the warm waters of the southern portion of the Bay of Bengal and carries moisture which it deposits when it is forced to rise over the central mountains. As a rule, the earlier months of each monsoon are wet and the later comparatively dry, but there is abundant rainfall practically throughout the year, the "summer," when the south-west monsoon is blowing, being the season of greatest rainfall on the south-western side of the island, and the "winter," when north-east monsoon prevails, on the north-eastern side. The driest parts of the island are the north-west and south-east coasts, for these face neither of the monsoons.

Productions and Trade.

The tropical vegetation is extremely luxuriant and varied, and the beauty of the scenery has won for the island the name "Pearl of the Orient." Tall tree-ferns, scarlet-flowering rhododendrons, magnificent palms, great bamboos, and many valuable timber trees, such as ebony and satinwood, abound, especially in the west and south-west, and at one time practically the whole island was forest-covered. Much of the plains and the lower slopes of the mountains have now been cleared and laid out in plantations, and towards the drier zones the forest thins out and gives place to park land. About one-fifth of the land is under cultivation, and the soil being rich, *agriculture* is by far the most important industry with 62 per cent. of the population dependent on it. Coffee was for many years the chief commercial product of the island, but the trees developed a fungoid disease, which the planters failed to overcome, and the crop was replaced by *tea*. The human and physical factors combine to make Ceylon an ideal tea-producing country, and the colony has become the third greatest tea-producer in the world, ranking after India and China. In 1925, 210 million pounds of tea were exported, of which 134 million pounds were sent to the United Kingdom,

most of the remainder going to Australasia, Canada, and the United States.

Ceylon is also a great producer of *rubber* and was the first country to grow successfully in plantations rubber trees introduced from the valley of the Amazon. This product now occupies about the same area as tea, which it challenges for premier place among the exports. In 1925, of the total export of 102,185,000 pounds, nearly 67 million pounds were sent to the United States, and just under 27½ million pounds to the United Kingdom.

By far the largest cultivated area, however, is devoted to *coconut* plantations, and coconuts and numerous coconut products, such as copra, coconut oil, coir, and desiccated coconut, form the third most valuable export, though falling a long way behind tea and rubber. *Rice* occupies the second largest cultivated area, being grown largely in small terraced fields on the south-west and north-east coastal plains, but the crop is insufficient for local needs and large quantities have to be imported. Other agricultural products of less importance, but of which quantities are exported, are *cinnamon*, *cocoa*, *areca nuts*, *citronella oil*, *cardamoms*, and *vanilla*.

Ceylon has been celebrated for its *gems*, chiefly rubies, sapphires, and moonstones, from time immemorial, but though there are many hundreds of small gem quarries working under native control, the combined value of the output of these, whether due to the primitive methods employed or the irregular deposits, is slight. The only mineral of world importance produced is *plumbago* (graphite). At the end of 1925 there were 180 plumbago mines working in the island, and in that year 309,000 cwts., having a value of £198,893, were exported. Other minerals, such as mica, gold, thorium, and monazite, are found, but not, except in the case of the last named, in commercial quantities. There is also a famous pearl fishery in the Manar Gulf, to the north-west of the island, where natives dive for the oysters, a proportion of which contain pearls of varying commercial value.

The only large scale manufacturing industries carried on at present are those dealing with agricultural products—tea, rubber, cocoa, and coconuts—but there are many native manufactures of minor importance, such as weaving, basket work, jewellery, metal work, lacquer work, earthenwares, and carving.

The principal imports of the colony are rice, cotton manufactures, coal and coke, manures, and sugar. Of the total import trade India supplies over a half and the United Kingdom about a fifth.

Ports and Communications.

Galle and *Trincomalee* are the only great natural harbours, but, with the increasing size of ships, Galle was found to be

dangerous, and Trincomalee, though it has one of the finest harbours in the world, is off the direct route of traffic and is of importance only as the site of the naval stores and dockyard of the island.

COLOMBO, the capital of the colony, situated on the south-west coast near the mouth of the River Kelani, has been provided with a magnificent artificial harbour and is the port through which almost all the trade now passes. The importance of this port is very much more than local, however, for its central position has given it a great transit, or entrepôt, trade. It is the great port of call of the Indian Ocean, and routes converge on it from South Africa, East Africa, Aden, India, the Straits Settlements, the Dutch East Indies, and Western Australia (see Fig. 14). It is a fortified coaling and oil-fuelling station, with large engineering works capable of carrying out ship repairs, others engaged in the manufacture and repair of agricultural machinery and implements, and lead-rolling mills for the preparation of the lead lining of tea chests. The city is the focus of the Ceylon railway system, lines radiating from it northwards to *Jaffna*, a seaport to the north of the island with a trade in tobacco, southwards to Galle, and inland to *Kandy*, a town of historical and educational importance near the centre of the island.

The *Maldivé Islands*, 400 miles south-west of Ceylon, are a dependency of the colony. They form a group of thirteen unhealthy coral islets (atolls) richly clothed with coconut palms, which supply the chief exports, coconuts, coir, and copra.

BRITISH MALAYA

British Malaya falls, politically, into three divisions, *viz.* :—

(1) The Crown Colony of the *Straits Settlements*, comprising Singapore, Penang (including Province Wellesley and the Dindings), and Malacca, together with the dependencies of the Cocos (or Keeling) Islands, a small group of coral islands lying in the Indian Ocean about 1,200 miles south-west of Singapore, Christmas Island, lying in the Indian Ocean to the south of Java, and the island of Labuan, about 6 miles off the coast of British North Borneo.

(2) The *Federated Malay States*, comprising the native states of Perak, Selangor, Negri Sembilan, and Pahang, which are under British Protection and in each of which there is a British Resident who advises the Sultan on administrative matters.

(3) The independent native states of the Malay Peninsula, usually referred to as the *Unfederated Malay States*, which are under British suzerainty and include Johore, a protected state, Kedah, Perlis, Kelantan, and Trengganu.

The total area of British Malaya is 52,600 square miles, so that the region is rather larger than England, and of this the

Straits Settlements cover 1,600 square miles, the Federated Malay States, 27,500 square miles, and the Unfederated Malay States, 23,500 square miles. The total population of about $3\frac{1}{2}$ millions is composed chiefly of Malays and Chinese, the latter acting as labourers, miners, shopkeepers, and contractors. In addition there is a large number of Indians who work on the plantations. The officials and planters are British and the merchants German and British, while there is a considerable number of Eurasians.

Physical Features and Climate.

The Malay Peninsula consists of a long lozenge-shaped arm of land extending south and south-east of the Indo-Chinese Peninsula of the mainland of Asia. Its main physical feature is a great central mass of mountains, in places rising above 7,000 feet in height, to which the ground-level rises steadily from both the east and the west coasts. This broken mountain mass stretches throughout British Malaya, the southern portion of the Peninsula, from north of Perak in the north to Negri Sembilan in the south, and, as a consequence, the many rivers are swift and suitable for navigation only near their mouths. The country lies between latitudes 1° N. and 6° N., and, therefore, the climate is constantly hot and moist, the mean temperature being about 80° F., and there are no seasonal variations either of temperature or rainfall, though both vary considerably according to locality and elevation. The region is swept alternately by the south-west and north-east monsoons, the south-west monsoon blowing from May to October and the north-east from November to March or April. On the west side of the peninsula, which is protected from the former by the mountains of Sumatra and from the latter, to a large extent, by the mountainous backbone of the country, the climatic changes are slight, there being a tendency towards drier weather in June, July, and August, and towards wetter weather in October, November, and December. The east coast, however, feels the full force of the north-east monsoon and has its heaviest rainfall in November and March, or sometimes in April. In the mountains of the interior the rainfall is very heavy, and even on the plains averages about 90 inches. In spite of the continuous heat and excessive humidity of the air, however, the climate is not unhealthy for Europeans of sound constitution and regular habits, and, with the exception of malaria, the country is extraordinarily free from the usual tropical diseases.

Productions and Trade.

The heavy rainfall and constant heat cause rapid and continuous vegetation growth, and "British Malaya—to give it the term by which 'The Golden Chersonese' is now known—may best be described as a jungle land, evergreen, bathed in sunshine,

refreshed by heavy rains. The foliage is wildly luxuriant. There is a tangled wealth of vegetation, constantly decaying, constantly renewing itself. We have yet to learn the true worth of the timbers contained in its forests, but where man has wielded the axe of civilisation, letting in light on dark places, the soil has readily responded to cultivation and given back of its riches an hundred-fold—from the spices and condiments so adventurously sought after by early Portuguese and Dutch voyagers to the sugar, coffee, sago, tapioca, rubber, and other produce of modern commerce. No tropical land has a greater variety of luscious fruits. The capitalist planter has found it an alluring field for his skill and enterprise. The miner has found a rich store of wealthy ores ready to his hand. The hunter in search of rare trophies and adventure, the more peaceful scientist, be he zoologist, entomologist or botanist, the mere tourist seeking fresh experiences amongst native races and in less travelled lands, will all find in British Malaya some new interest to fascinate and to please them.”¹

The staple products of the region are *rubber*, *tin*, and *copra*, and these form the chief exports in order of value. The similarity of the climate to that of the Amazon basin causes the Para rubber tree to thrive luxuriantly, and over two million acres are laid out as rubber plantations, only a fraction of the acreage which could be planted if the demand for rubber were sufficient to warrant the larger supplies. Most of the plantations are in the Federated States of Perak and Selangor, but there is also a large output from the plantations of Johore, and in many other parts of the country plantations are flourishing. British Malaya is by far the largest producer and exporter of rubber in the world. The enormous rubber-production makes the production of other agricultural commodities seem small by comparison, but the *coconut* plantations are already of great value, and are steadily extending, copra being the third most valuable export. Other agricultural exports of minor importance are *pepper*, *pine-apples* (canned for export at Singapore), *sago*, *tapioca*, *areca nuts*, *rattan canes*, *gambier*, *gutta-percha*, and *hides*. The production of *rice*, grown both by Malays and on plantations, is considerable, but large quantities have to be imported. Recently the oil palm has been introduced, for it has been found that, in Malaya, when grown under careful supervision, the tree yields palm oil suitable for human food, the oil being free from the vegetable acids which render the West African product unfit for that purpose.

The production of *tin*, in which the peninsula is particularly rich, is second in value only to that of rubber, and the tin production of British Malaya is the largest in the world. In 1926 the export from the Federated Malay States amounted to 45,946

¹ *British Malaya, Trade and Commerce*, published by the Malay States Information Agency.

tons, the tin being smelted at the great works established at Penang and Singapore. *Gold* is produced in small quantities, and many other metals are found, though they have not so far been discovered in workable form. *Coal*, mined at Rantau Panjang in Selangor, provides fuel for the mines and railways. *China clay* occurs in many parts and is being successfully exploited, the bulk of the porcelain cups required for collecting the latex from the rubber trees being manufactured locally. *Phosphates*, the sole commercial product of Christmas Island, where one of the largest deposits of the world exists, is the only other mineral produced in considerable quantities.

In the list of buyers of British Malayan produce, the United States ranks first, taking the bulk of the rubber and tin. In order follow the Dutch East Indies, the United Kingdom, British India, Siam, France, Germany, Hong-Kong, and China. The rubber export goes chiefly to the United States, Great Britain, Japan, and Germany, in that order; the tin, to the United States, Great Britain, France, and Italy; the copra, to Germany, Holland, Great Britain, and France; and of the other commodities exported, coffee goes mainly to France, India, and Ceylon; tinned pine-apples, to Great Britain and the United States; gambier, to the United States, India, and Great Britain; gutta-percha, to Great Britain and the United States; rattans, to Hong-Kong, the United States, and France; sago and tapioca, to Great Britain, Italy, France, and India; and spices, chiefly pepper, to India, Great Britain, the United States, Germany, Hong-Kong, French Indo-China, and Australia.

The employment of such a large percentage, about half, of the population in the production of goods for export necessitates a large import of food-stuffs. Of these *rice*, the heaviest item, as it is the staple diet of the population, comes from Burma, Siam, and Cochin China; sugar, from Java and Japan; and fish, from Cochin China and Japan. There is also a large import, chiefly from the United States, the Philippines, the Dutch East Indies, India, and Great Britain, of tobacco, cigars and cigarettes, for the Chinese are heavy smokers. Large quantities of cotton piece-goods too are imported, chiefly from Great Britain, followed by India, Japan, and China. The considerable and growing demand for motor cars is satisfied chiefly by the United States.

Communications and Towns.

The early British officials of Malaya soon realised that no proper development of the country could take place until rapid means of transport were provided, and they constructed the nucleus of the present road system, probably the best of any tropical country. Its extent is some 3,000 miles, and a main trunk road runs down the length of the peninsula from Prai, on

the mainland opposite Penang, to Singapore, crossing from the mainland by a causeway. From this there are numerous roads branching off to the west coast and the interior, and one reaching the east coast at Kuantan. The main railway line also extends the length of the peninsula from Prai to Singapore, and there are numerous branch lines serving the planting and mining centres and connecting the various ports on the west coast with the main line. The rivers, however, are much used by native craft, and in many parts of the country are the only possible means of communication.

SINGAPORE, the most important of the Straits Settlements, is an island about 27 miles long and 14 miles wide, separated from the southern extremity of the peninsula (Johore) by a strait three-quarters of a mile wide. The seat of government of the colony is the town of Singapore, situated at the south-eastern point of the island, which is also by far the most important commercial centre and port of the whole country. The port is "free," its harbour spacious and safe, and its position at the junction-point of all routes connecting the Indian Ocean with the China Sea, has given it immense commercial and political importance, as is shown by the construction of the naval base now in progress there. Singapore has naturally become a great entrepôt and is the great collecting and distributing centre for the whole of the Malay Archipelago and, to a less extent, for Lower Burma, Siam, and Indo-China.

PENANG is the second most important commercial centre and port of British Malaya and, like Singapore, has a large entrepôt trade. Its total trade, however, is much smaller than that of the latter port. The island of Penang lies at the northern extremity of the Strait of Malacca, separated by a channel 2 to 10 miles wide from Province Wellesley on the mainland.

MALACCA, situated on the south-west coast 100 miles from Singapore, though the largest of the Settlements has been eclipsed as a port by Penang and Singapore, both of which are of more recent development. Nevertheless it still has a considerable trade, and prospects for the future are foreshadowed by the construction of railway communications and by the development of rubber plantations.

PORT SWETTENHAM, on the west coast, 22 miles from *Kuala Lumpur*, the capital of the Federated Malay States, is the only port of the States with a large foreign trade, for it is the only one whose harbour is sufficiently deep for large ocean-going vessels.

LABUAN has a fine harbour, affording safe anchorage for large vessels, but it has not developed as a port and commercial centre, for the mainland opposite the island is still largely undeveloped.

BRITISH BORNEO

British Borneo comprises *British North Borneo*, a territory under the jurisdiction of the British North Borneo Company, administered by a Governor, and the adjoining north-west coast territories, both of which are under British Protection, *viz.*, *Brunei*, administered by a British Resident at the Court of the Sultan, and *Sarawak*, governed by Rajah Charles V. Brooke, an Englishman. The total area is about 76,000 square miles, and the population about 883,000. The people live in scattered villages chiefly in the coastal districts and along the banks of the rivers. The native races form the greater part of the very mixed population, but the development of the country depends on the many thousands of immigrant Chinese, Malays, East Indians, and Filipinos, who are miners, cultivators, plantation labourers, and traders. The few Europeans are mainly officials and plantation owners.

The British territory includes the northern and north-western parts of the island and extends inland as far as the main watershed, a range of mountains which rises, in British North Borneo, to a height of 13,680 feet. The region lies between latitudes 1° N. and 7° N., and the uniformly high temperature and abundant rainfall at all seasons cause the whole country, with the exception of the relatively small areas cleared for cultivation, to be clothed with dense forest. The position and general physical conditions, therefore, are similar to those of British Malaya, and the lines on which agricultural development should take place also are similar. The forests contain a wealth of valuable timbers, which have as yet been but little worked, and many natural products which are gathered by the natives and sold or bartered by them to the Chinese traders. Of these the chief are rubber, gutta percha, gums, camphor, rattan canes, and edible birds' nests, highly prized as an article of diet by the Chinese epicure. Cultivation is important only in the coastal regions, where the chief agricultural exports of pepper, sago, rubber, and tobacco are produced. *Pepper* has been cultivated and exported by the Chinese settlers for many years and is largely cultivated for export in Sarawak. *Sago*, also, is grown in large quantities in Sarawak, and sago flour, the product of the factories at Kuching, is an important export of the state. These two products were for long the chief articles of commerce of British Borneo, but *rubber* is now much the most important agricultural product. There are extensive rubber plantations both in Sarawak and British North Borneo, and it has become a valuable and rapidly developing export. The suitability of the climate and soil are such that, as in the Malay Peninsula, the output might be very much increased if the demand were sufficient. *Tobacco*, which, in certain jungle districts, grows wild, is produced in large quantities on the North Borneo Company's plantations and, in

spite of the competition from the more profitable plantation rubber, large quantities of fine tobacco leaf are exported, chiefly for the manufacture of cigars.

The whole region is very rich in minerals, and *gold* has been worked in Sarawak by the Chinese for many centuries. It is now worked also by the Borneo Company, and forms a valuable export. *Coal* exists in large deposits in all three divisions, but has not yet been extensively worked. It is found also in Labuan. The most important mineral, however, is *petroleum*, and there are valuable oil-fields, the chief of which is at Miri and Bakong, in Sarawak.

Transportation is afforded mainly by means of the rivers, which are fortunately large and numerous. The largest in British territory, the Rejang in Sarawak, is navigable for small steamers for about 160 miles from its mouth, and other rivers in Sarawak also are navigable for considerable distances. In British North Borneo and Brunei, however, they are shorter and more rapid, owing to the closer proximity of the mountains to the coast. The natives travel in canoes manned by about a dozen men, poling and pushing upstream over the many rapids and shooting them in descending to the coast with the jungle products for sale or barter in the Chinese bazaars. In Sarawak the great centre for foreign trade is *Kuching*, the capital, situated 20 miles up the Sarawak River, which is here navigable for ships of up to a 1,000 tons. From this port the exports of rubber, sago flour, pepper, gutta-percha, cutch (mangrove extract, used in tanning), benzine, kerosene, fuel oil and crude oil, gold, fish, and gums, are shipped. The chief ports of British North Borneo are *Sandakan* on the east coast, the administrative capital and chief commercial centre, and *Jesselton*, on the west coast. Their trade is, however, comparatively small. The exports include rubber, tobacco, timber, and many forest products, in addition to seed pearls, edible birds' nests, and *bêche-de-mer*, or sea slugs, which are eaten in large quantities by the Chinese. *Brunei*, the chief town of British Borneo, exports coal.

The trade is chiefly with Singapore, Hong-Kong, and Manila, which act as entrepôts, the important imports being cotton piece-goods, food-stuffs (including rice and meat), hardware, earthenware, small metal goods, and mining machinery.

HONG-KONG

The Crown colony of Hong-Kong consists of the island of that name, some 32 square miles in area, a number of neighbouring islands, and the peninsula of Kowloon on the mainland, the whole colony covering an area of 405 square miles. The island of Hong-Kong is situated at the mouth of the Canton River, about 90 miles south of the Chinese city of Canton. It is of irregular

form, the southern coast being deeply indented, and its surface is rocky and hilly, a feature responsible for the settlement of the population in the coastal region. As it lies on the edge of the tropics in the track of the monsoons, the climate is very hot and moist in summer, but warm and generally dry in winter. Unfortunately, it lies in the track of the typhoons of the China Sea, which are especially common from August to November and occasionally do much damage to shipping, even in such a normally safe harbour as Hong-Kong.

The chief city and port of the colony is *Victoria*, known simply as "the City," situated near the western end of the northern shore of Hong-Kong island. Its harbour, formed by the strait which separates the island from Kowloon, is one of the finest in the world, and as the port has, like Singapore, no artificial restrictions on its trade, except as regards the importation of intoxicating liquor and tobacco, it has developed an enormous collecting and distributing trade. It serves as an entrepôt for the products of Eastern countries for export to European and other markets, and for manufactures and other goods forwarded for distribution to the countries of the East. Of the innumerable and wide variety of commodities handled, tea, silk, coal, oil, sugar, tin, rice, camphor, cotton and cotton goods are the chief. The island is, further, a British military and naval station of first importance, and has important industries, the chief of which are sugar refining, shipbuilding and repairing, rope making, tin refining, tobacco manufacture, cement manufacture, and the manufacture of knit goods. Deep-sea fishing also is important.

WEIHAIWEI

Weihaiwei is a port of the Chinese province of Shantung and, with the island of Liu Kung, all the islands of the bay on which the port is situated, and a belt of land ten English miles wide along the coastline of the bay, was leased to Great Britain by China in 1898. The harbour, well sheltered by Liu Kung island, was used by the British Naval Squadron in Chinese waters as a sanatorium, the mild summers being a welcome relief from the heat of places further south.

As a result of the Shantung Settlement at Washington (January, 1922) the territory is to be restored to China.

MANDATED TERRITORIES

IRAQ

The Arab Kingdom of Iraq (Mesopotamia) extends over the plain formed by the rivers Euphrates and Tigris, the site of the ancient empires of Assyria and Babylon, and comprises the

former Turkish *vilayets* of Mosul, Baghdad, and Basra. In area it is over $2\frac{3}{4}$ times as large as England, and its population of nearly 3 millions is composed chiefly of Arabs and Kurds, though in the towns there is a medley of Jews, Turks, Greeks, Syrians, and Armenians. Like the Punjab, which lies within similar latitudes, the country is hemmed in by mountains and deserts. To the east lies the rugged edge of the Persian plateau; to the north are the mountains of Armenia and Kurdistan, in which rise the two great rivers of the plain; and on the west and south-west lie the Syrian and Arabian deserts. Only in the south-east, where there is a narrow strip of coastline washed by the waters of the almost landlocked Persian Gulf, is the way open for large scale commercial dealings with the outside world, and through the outlet thus provided passes not only the local trade of Iraq but also a considerable transit trade for the surrounding countries. The rich alluvial plain is flat and, for the most part, treeless, and the principal resources of the country are agricultural. Unfortunately, however, the rainfall is very small (8 to 15 inches), and the full development of the region depends on the construction of irrigation works. The climate is essentially Mediterranean in type, the summers being dry, but the more continental situation of the country causes it to experience much greater seasonal variations of temperature than do the lands bordering the Mediterranean Sea, the summers being very hot and the winters cool and sometimes cold.

The cultivation of the land is by far the most important occupation of the people, but many of the Arabs are pastoral nomads, and there is a considerable amount of stock-rearing, especially near the borders of the plain. The principal products are *cereals* (chiefly wheat and barley, but also rice, maize, and millet), *dates*, *wool*, and *pulses*. Other products are figs, almonds, peaches, tobacco, and cotton, the production of the last named being capable, according to recent experiments, of much development. The *oil* resources of the country have not yet been fully investigated, but rich deposits are believed to exist. The main import is textile goods, followed by tea and sugar.

The rivers form the chief means of communication, and the Tigris is navigable for small draught steamers as far as Baghdad throughout the year. Ocean-going vessels ascend the Shat-el-Arab, the joint Tigris and Euphrates, for 70 miles to *Basra*, the chief port. The development of this port was largely due to the requirements of the British Army during the Great War, for it was used as a base for the military operations against the Turks and the harbour was so improved that it now takes vessels of deepest draught and is very finely equipped. *Baghdad*, the capital, is the chief railway centre, and from it important lines radiate southwards to Basra, northwards to Shergat, 75 miles south of *Mosul*, and eastwards to *Khaniqin*, near the Persian frontier.

The country is governed under a British mandate by a king and an Arab government with a British High Commissioner to give advice, and is a land of great possibilities, attracting international attention. It is of importance to the Empire, however, not only on account of its potentialities as a great wheat, cotton, and oil producer, but also because of its great strategic value. One of the chief sources of oil for the navy is the south-west Persian oil-field, worked by the Anglo-Persian Oil Company, and the security of this field and of the pipe-line to Abadan, on the Persian Gulf, depends on the Power dominating Southern Iraq and South-West Persia. Further, the head of the Persian Gulf has hitherto been the one weak spot in British defences round the Indian Ocean, and on our possession or control of the country, or at least on its occupation by a friendly and non-naval Power, depends the security of the British territories bordering that ocean. To this it may be added that when the European-Basra railway line is completed, the importance of the country will be greatly increased; it is at present an important stage in the Imperial air route to India; it may some day be linked with that country also by rail; and its influence on the security of existing and future lines of communication within the Empire is consequently great.

Although a country of ancient civilisation, traces of which still remain, Iraq owes its present economic position to the military administration exercised by Great Britain. Communications, especially, are the product of the military authorities who, admittedly, required the railway lines for their own purposes, but at the same time were performing an economic service for the country. More altruistic has been the attention given by them to irrigation and the provision of a healthy water supply, which are so necessary in a country whose main needs are water and population. Immigration offers no solution to the latter problem, and the only possibility for the country to develop along natural lines, *i.e.*, agriculturally, is through a substantial decrease in the high death-rate. To this end the sanitary measures imposed by the military administration have proved invaluable.

With regard to the other possibilities of Iraq, cotton and oil, prospects are bright, particularly in the latter case, where companies of international interests have brought capital for the exploitation of the mineral. Experiments in cotton, too, are decidedly promising and likely to attract further capital investments.

According to a treaty between Iraq and Great Britain, signed in Baghdad in 1926, the responsibilities of Britain as the mandatory power are to continue for a period of 25 years from the date thereof, unless in the meantime Iraq shall have become a member of the League of Nations, when British responsibility for the country will lapse.

PALESTINE

Palestine is a small country which, like Iraq, until its conquest by the British in 1917-18, formed part of the Turkish Empire. It is bounded on the west by the Mediterranean Sea and on the landward side by artificial and somewhat indefinite frontiers. To the east lies *Transjordan*, governed by an Arab emir under the British mandate for Palestine. The region may be divided into three physical divisions: (1) a narrow coastal plain extending throughout the length of the country, except where it is interrupted by the promontory of Mount Carmel; (2) the plateaux of Samaria and Judæa rising from the plain on the east; and (3) the great rift valley of the River Jordan and the Dead Sea, the surface of which is 1,300 feet below sea-level. The coastal plain has been for centuries the most important land route between Europe, Asia, and Africa, and it is now followed by the railways. Its fertility and favourable climate make it the most productive and, therefore, the most populous part of the country. The climate is of the Mediterranean type modified by local conditions of altitude, the coastal plain being sub-tropical and moist, the plateaux temperate and drier, while the rift valley is very hot and dry. The rainfall everywhere is small, varying from 16 to 27 inches, and occurs during the months November to April. As in Iraq, therefore, the full development of the region depends on the construction of irrigation works. The products are chiefly agricultural and pastoral, considerable quantities of wheat, barley, lentils, and fruits, including oranges, peaches, and olives, being obtained, and many sheep, goats, and camels being reared. The mineral wealth is of small importance, though there is an abundance of rock salt in the Jordan Valley and petroleum is said to have possibilities, and, while there are many small manufacturing industries, only three are of export importance, *viz.*, soap boiling, wine making, and the preparation of olive oil. Considerable quantities of *oranges* are exported from *Jaffa*, the chief port, which also exports laundry soap, water melons, wine, almonds, sesame, and hides and skins. *Jerusalem*, the capital, is centrally situated for the administration of the country and is the headquarters of the British High Commissioner.

The Imperial importance of Palestine is, however, much more strategic than economic, though in the latter respect progress has been extensive and continuous. The strategic importance of the country arises out of its position on the flank of the Suez Canal, "the spinal cord of the British Empire," and where present and projected railway routes connect Europe, Asia, and Africa. If it were not controlled by Britain it might well be occupied by some foreign Power, and, especially if this Power were allied with a hostile Egypt, the security of our lines of communication with the East would be very seriously threatened.

Palestine, like Iraq, is administered by Great Britain under a mandate from the League of Nations, and there is a definite intention, on the part of the members of the League, that a home for the Jewish people be established there, as was manifested in the famous Balfour Declaration, endorsed by the Allied Powers and embodied in the Treaty of Sèvres. Since 1918 there has been a large number of Jewish immigrants, particularly from the southern states of Russia, who have settled on the land and are likely to bring about an improved condition of agriculture. The Jews, however, still form a very small minority among the Arab population.

As in Iraq, great improvements were effected during the British military occupation, and the new irrigation schemes, new lines of communication and improved sanitary arrangements, were in the first place the work of the British military administration.

CHAPTER XI

BRITISH SOUTH AFRICA

THE UNION OF SOUTH AFRICA

THE Union of South Africa consists of the provinces of Cape of Good Hope, Natal, Transvaal, and Orange Free State, and is about nine times the size of England. It is bounded on the north by South-West Africa, which is administered under the mandate of the League of Nations as a part of the Union, the Bechuanaland Protectorate, and Southern Rhodesia, and on the east by Portuguese East Africa and Swaziland.

PHYSICAL FEATURES

Physically, the country forms part of the great South African plateau which extends northwards into Central Africa. It is, like the rest of Africa, compact in shape and for the most part has the same uniformity of features. Three broad physical regions may be distinguished: *a narrow coastal plain* rising to *an escarpment*, which marks the transition between the coastal plain and *the interior plateau*, or *High Veld*, a vast tableland 3,000 to 6,000 feet above sea-level.

THE COAST BELT, encircling three sides of the plateau, has an average elevation of 500 to 600 feet and varies considerably in width and formation. In the *south* it rises from a strip of low country along the coast to a terrace, which is succeeded, as the interior is approached, by long parallel mountain ranges, culminating in the range which forms the edge of the plateau. Between these ranges are stretches of flat, dry country, forming great steps up to the *High Veld*. The first, the *Little Karroo*, between and running parallel to the Langeberg and other ranges and the Zwarteberg Range, varies from 15 to 20 miles in width and has an average elevation of 1,500 feet. The second, the *Great Karroo*, lies between the Zwarteberg Range and the edge of the plateau, here known as the Nieuwveld Range. As its name implies, it is of much greater extent than the first step. It forms a great stretch of undulating plains, 2,000 to 3,000 feet above sea-level, about 100 miles wide, extending for about 400 miles from east to west. On the *east* and *west*, the coastal belt is much narrower

than in the south, and the ascent to the plateau is much more abrupt, taking the form of a series of well-marked parallel terraces or steep slopes.

THE ESCARPMENT, or edge of the plateau, forms a curved line of mountains over 2,000 miles in length, loftiest in the east and south. Passing southward down the east coast its chief range is the Drakensberg Mountains, which rise to 11,000 feet above sea-level in Natal. From the south-western end of these mountains the escarpment takes a westerly course and is marked by such ranges as the Stormberg, Sneeuwberg, Nieuwveld, Kornberg, and Roggeveld Mountains, being merged for a time in the parallel ranges of mountains north-east of Cape Town. Here it bends to the north and passes into South-West Africa, where it reappears as a definite escarpment.

THE INTERIOR PLATEAU, or VELD, is composed of horizontal layers of rock which, during the ages, have weathered down leaving isolated flat-topped heights or hills, known locally as *kopjes*, which rise several hundred feet above the general gently undulating surface of the plateau. There are, however, some ranges of hills, of which that known as the *Witwatersrand*, in the Transvaal, is the most important. This ridge of hard granite rock, of no considerable height, is at present the richest gold-mining area in the world. The *veld* is highest in the east, and the *Orange* and *Vaal* Rivers, rising in the Drakensberg Mountains, carry the main drainage to the Atlantic Ocean. After their confluence west of the Orange Free State, the river thus formed flows through an increasingly arid region and, on reaching the western edge of the plateau, descends to the coastal plain by the Great Aughrabies Falls. In the north and north-west of the Transvaal the plateau slopes down to the valley of the *Limpopo*, which rises in the Witwatersrand and drains eastwards to the Indian Ocean. The other rivers have cut deeply into the tableland, from which they descend in falls and rapids. Few of the rivers are continuous streams throughout the year, for during the dry season they dry up into strings of pools, and become raging torrents after the rains and liable to flood in the wet season. They are consequently of little economic value, being of use neither for irrigation nor for transport; indeed they have proved serious barriers to communication.

The *coastline* of the country is very regular with a marked absence of peninsulas and islands, and, as there are few headlands and bays and the river mouths are choked with sand bars, good harbours are few.

CLIMATE

It is only in the north of the Transvaal that the Union of South Africa extends into the tropics. Elsewhere it lies within

the warm temperate zone and, generally, the summers are hot and the winters mild. Owing to the elevation of the interior and to the fact that the general level tends to rise towards the north, *i.e.*, towards the equator, thus counteracting the ordinary increase of temperature with decrease of latitude, the mean annual temperature of the different parts of the country is remarkably uniform. Thus at *Mossel Bay*, on the south coast, the mean annual temperature is 63.3° F.; at *Cape Town*, on the south-west coast, it is 62° F.; at *Graaff Reinet*, on the Great Karroo, 2,460 feet above sea-level, it is 63.6° F.; at *Ookiep*, in Namaqua Land, 3,036 feet above sea-level, it is 63° F.; and *Pretoria*, about 600 miles farther north than Cape Town, but situated at an altitude of 4,392 feet, has a mean annual temperature of 63.5° F. As, however, the eastern and southern coasts of the country are washed by the warm Mozambique current, while the western coast is washed by the cooler Benguela current, different temperature effects are produced according to the special influence under which a particular region may come. For example, *Port Nolloth*, on the north-west coast of Cape of Good Hope province, experiences a mean temperature of 59° F. in February and 53° F. in July, while the temperature for those months at *Durban*, in Natal, on the east coast, is respectively 76° F. and 64° F. In summer, as a result of the clear skies, the plateau experiences very high temperatures by day, and at that season the temperature at *Kimberley*, over 4,000 feet above sea-level, is almost as high as at Durban. In winter, however, the temperature on the plateau is much lower than it is on the coast, for the heat received by the land is rapidly lost by radiation through the clear air. For this reason, also, the difference between day and night temperatures is much more marked on the plateau than on the coast. The range of temperature during the year is, consequently, much greater at places situated on the plateau than at those situated on the coast, and while in the interior on the southern part of the plateau the temperature may fall below freezing-point at night during any month of the year and in winter severe frosts are of fairly frequent occurrence, on the coast such vagaries of climate are practically unknown.

The most striking contrasts between the different parts of the country are those of *rainfall*. (Fig. 32.) The south-east trade winds blow over the whole region during the summer months, and most rain falls at this season. After crossing the coastal belt the winds are forced to rise over the eastern escarpment of the plateau, and, as a result, the coastal region and the windward slopes of the Drakensbergs receive abundant rainfall. Beyond the escarpment, however, the precipitation steadily diminishes, until, at Port Nolloth, the mean annual rainfall is only 2 inches, and a considerable area in the west, having less than 10 inches of rain in the year, forms part of the Kalahari Desert. Generally speaking, South Africa has wet summers and

dry winters, but an important exception to this is found in the south-west coastal region of Cape of Good Hope province, where, owing to the movement of the wind systems with

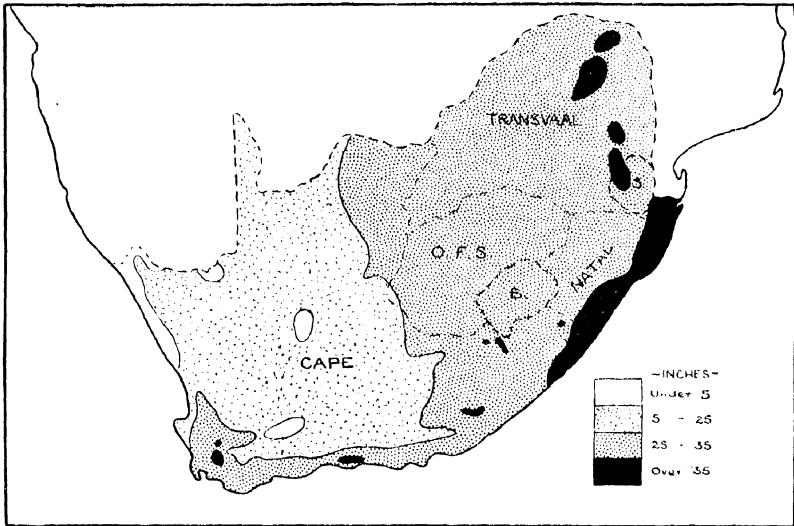


FIG. 32.—THE MEAN ANNUAL RAINFALL OF THE UNION OF SOUTH AFRICA.

the sun, the climate is of the Mediterranean type, the westerly winds bringing rain during the winter, and the summers being dry. Off Cape Agulhas, owing to the meeting of the warm Mozambique current with the cool Benguela current, frequent fogs occur.

NATURAL REGIONS

The Union of South Africa may be divided into seven broad natural regions. (Fig. 33.)

(1) *The South-West of Cape Province.*—This region has a Mediterranean type of climate, the rainfall of from 20 to 40 inches per annum falling during the winter. Here the vegetation is of the scrubland type, being composed of shrubs and bushes of the usual drought-resisting species found in Mediterranean countries. *Grapes* and other fruits are produced in plenty and the wine industry is important. *Wheat, barley, and tobacco* are grown in considerable quantities.

(2) *The South of Cape Province.*—The coastal region stretching eastwards to beyond Port Elizabeth has rain both in summer and winter, the annual total being from 20 to 30 inches, and the temperature is rather higher than in the Mediterranean region, especially towards the east. The coast is forested with tall evergreen timber trees such as *yellow wood, iron wood, and*

stink wood, but towards the interior the vegetation passes through scrub into grass-land. *Maize* and *tobacco* are the principal crops and *sheep* and *cattle* are reared in large quantities.

(3) *The South-East Coast*.—Here the rainfall of from 30 to 40 inches comes in summer, about 70 per cent. of the total being received between October and March, and the temperature is uniformly high. Sub-tropical forests containing many palm trees cover the coastal lowlands and towards the interior, on

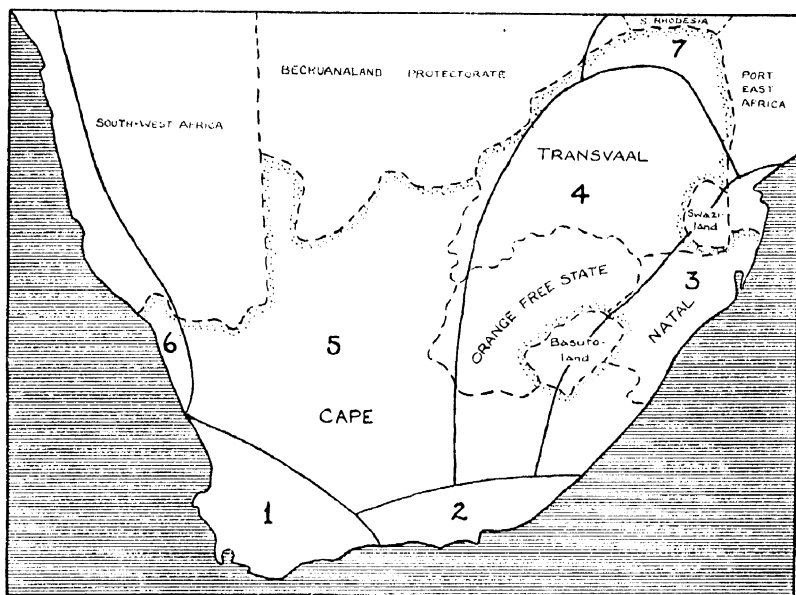


FIG. 33.—THE BROAD NATURAL REGIONS OF THE UNION OF SOUTH AFRICA.

the higher terraces, grass-land is found. On the coast *sugar-cane*, *tea*, *rice*, *maize*, *cotton*, *bananas*, *pineapples*, *oranges*, and *mangos* are cultivated, while, inland, in the midland districts, there are plantations of *wattle*, the bark of which is used in tanning. On the higher lands *temperate cereals* are produced, *sheep* and *cattle* are raised, and *dairying* is important.

(4) *The Eastern Interior*.—This region lies between 4,000 and 5,000 feet above sea-level. The rainfall of 20 to 35 inches occurs chiefly in summer, which is hot, the winter being dry and cool, with frost. Typical grass-land vegetation covers this portion of the plateau, which is an undulating plain often without a tree or bush to relieve the monotony of the landscape. In summer the grass is bright green, but in winter it becomes reddish brown. *Wheat*, *maize*, *tobacco*, and *cotton* are grown, and *cattle*, *sheep*, and *ostriches* are reared.

(5) *The Western Interior and the Karroos*.—Here the small

rainfall, decreasing towards the west and north-west, causes the vegetation of the veld to be poor grass-land, with thorn bush, passing westward into semi-desert. The Karroos, too, present a desert-like appearance for most of the year, the only vegetation relieving the burnt-up, brown, and dusty appearance of the landscape being a scattered bush growth which, fortunately, provides good grazing for sheep and goats. The small rainfall of the Karroos, however, which falls in heavy showers in January, February, and March, has a wonderful effect, the first showers rousing the plants to life and carpeting the region with flowers. *Cattle*, *sheep*, and *goats* are reared in large numbers both on the veld and the Karroos, and on the Little Karroo *tobacco* and *lucerne* are grown, and large numbers of *ostriches* are kept.

(6) *The North-West Coast*.—Here desert conditions prevail, the rainfall of from 1 to 5 inches being insufficient to support vegetation. The region north of Olifant's River, extending into South-West Africa, is one of sand dunes with but few plants, and those specially adapted to the adverse conditions.

(7) *The Limpopo Basin*.—The only part of the Union coming within this region is the extreme north and north-east of the Transvaal. This is the *Low Veld*, mostly below 3,000 feet in height. The rainfall is small and the country is generally flat and scrub-covered, forests occurring only along the banks of the river. Though the pasture is suitable for cattle-raising, the climate is unhealthy both for man and beast.

It will be observed that only a very small portion of the country is forested, and that grass-land is the prevailing type of vegetation. As a result of this there is a scarcity of timber, and large quantities have to be imported every year.

INDUSTRIES AND PRODUCTIONS

Until the discovery and rapid development of the diamond and gold mines South Africa was exclusively agricultural and pastoral, and despite the great importance of mining and the growing importance of manufactures, farming remains the staple industry of the Union.

Fishing.

The fishing industry has been neglected, and though the shallow waters of the *Agulhas Bank* and the cool waters of the Benguela current yield many varieties of edible fish, the industry is of comparatively small importance. Sea-fishing was for long a native industry, carried on in near-shore waters, and it is only within the last forty years or so that attention has been directed to the possibilities of developing the fisheries. Large quantities of fish are now obtained, chiefly for the home market, steam trawlers operating from the ports of *Cape Town*, *Simon's Town*,

Port Elizabeth, and *Durban*, but there is much room for improved methods in the catching, curing, and distribution of the fish. Whaling is carried on from *Durban* and *Cape Town*, and the products of the industry, notably whale oil, form an important export.

Pastoral Industries.

By far the most important branch of farming is the keeping of sheep, cattle, goats, and ostriches, and the exports provided by the pastoral industries are first in bulk, though second in value. The agricultural census of 1925 showed that *sheep* are by far the most numerous of the animals reared; in that year there were in the Union over 35½ million sheep, as against 9¾ million *cattle*, and over 8 million *goats*.

SHEEP.—About half the sheep of the Union are found in Cape Province, on the Karroos and in the south-east, the principal centres being *Graaff Reinet*, *Somerset East*, *King William's Town*, and *Queenstown*, and this accounts for the fact that *Uitenhage* is the greatest wool-washing centre and *Port Elizabeth* the chief wool port of the country. There is no export of mutton, the sheep being reared chiefly for wool, and on the Great Karroo the sheep farms often have as many as 10,000 of the fine-woolled Merino sheep. There are large farms, also, in the Orange Free State, which province contains about a third of the total number of sheep reared. Here, however, owing to the better quality of the pasture, the number of sheep to the square mile is much larger than it is in Cape Province or in the Transvaal and Natal, which come next in order as sheep-rearers. The wool production of the country is great (over 208½ million pounds being exported in 1925), but the sheep farmers have often to labour under great difficulties: the hot, dry, shadeless character of much of the land gives rise to many animal diseases, and to the grave problem of adequately watering the flocks. Most of the diseases attacking not only sheep but goats, cattle, and horses can, however, be prevented by dipping, though to be effective this has to be frequent. It has been said that "gold, diamonds, and the dipping-tank have been the three great factors in South Africa's prosperity, and the greatest of these will almost certainly prove to be the dipping tank."

CATTLE.—The greatest cattle-rearing provinces are the Cape, Transvaal, and Orange Free State, but there are considerable numbers, also, in Natal, where, however, the prevalence of lung-sickness is a great drawback, especially on the hot, wet coastal lands. On the high veld the cold and drought of winter often make it necessary for the farmers to trek with their herds to the warmer and moister bush veld or into Natal. The cattle are reared mainly for draught purposes, as horses are readily

attacked by disease, and the bullock cart is one of the most common forms of transport. There is no export of beef, but it is predicted that stall-feeding of slaughter cattle for the overseas markets has a great future. *Hides*, however, are shipped in large quantities, and *dairying* is growing in importance both in Cape Province and Natal. As a whole the country, with its droughts and uncertain rainfall, has not the natural conditions for dairying which exist in countries such as New Zealand, but there are many favourable conditions enormously enhanced by irrigation schemes, and great possibilities have been created for the industry in this way. The irrigated lands have a prolific yield of lucerne and root crops, and, with stall feeding, will carry as many as two cows to the acre. South Africa is nearer to Great Britain, the world's greatest market for dairy produce, than Australia and New Zealand, by several thousand miles, and liners fitted with refrigerated space sail weekly for the Mother Country. Railways serve the irrigated lands, connecting them with the great ports, and there is plenty of suitable labour. Further, the demand for dairy produce, though already large, is capable of almost indefinite expansion, and the variable seasons in different parts of the world militate against over-production. With permanent irrigation, South African dairy farmers are independent of a regular rainfall and enjoy the added advantage of having constant supplies of dairy produce to offer. Much land is already under irrigation, though on the Little Karroo large areas which might more profitably be used for dairying are still used for feeding ostriches, and the development of the industry to the full extent of its possibilities depends very largely on the adoption of co-operative methods of organisation, such as are applied in other Dominions and in Denmark.

GOATS.—Cape Province has the largest number of goats, but they are found in considerable numbers also in the Orange Free State and the Transvaal. They will thrive on pasture too poor for sheep, and, like them, are reared in large numbers on the Karroos. Most of the goats are native to the country and are reared by the Kaffirs for their flesh, but on the Great Karroo, in the Graaff Reinet-Cradock district, there are large herds of Angora goats, which are raised for their long white "mohair," greatly valued for its silken texture and used with wool and cotton in the manufacture of fine dress materials. Practically all the mohair is shipped overseas to the Bradford market.

HORSES, MULES, and ASSES.—*Horses* are bred successfully in the Colesberg district of Cape Province, the Winburg district of the Orange Free State, the Wakkerstroom district of the Transvaal, and the higher regions of Natal. Unfortunately, however, the country has been repeatedly ravaged by a disease known as horse-sickness, and, owing to this, many parts have, for the time being at least, become uninhabitable by horses. *Mules*,

which are less affected by horse-sickness than are horses, thrive wherever horses flourish, and the *ass*, practically immune from this disease, thrives even where horses cannot exist.

PIGS.—There are over 800 thousand *pigs* in the Union, and, in view of the large production of maize, their numbers might be much increased. They are reared chiefly by Kaffirs in Cape Province, but there is a good future for the *bacon* industry if properly organised and developed.

OSTRICHES, of which there are nearly 163 thousand in the Union, are reared chiefly in Cape Province, where there are large ostrich farms on the Little Karroo round *Oudtshoorn*, *Uitenhage*, and *Grahamstown*. The birds are reared for their feathers, and, as a result of their domestication, have increased rapidly in numbers. In 1913, when ostrich feathers were highly prized for female adornment, the ostrich-farming industry was in a very favourable position, in that year the feathers exported being valued at £3,000,000, but a collapse occurred largely as a result of over-production followed by the outbreak of war, and the inevitable change in fashion. There is now little demand for ostrich feathers, the value of the exports in 1925 being only £203,000, and, until they again play an important part in ladies' millinery, the industry must perforce remain depressed. It is being urged that much of the land occupied by ostrich farms might profitably be used for dairying, an industry, happily, entirely independent of the vagaries of fashion.

Agriculture.

Cultivation of the land has been carried on by the natives on primitive lines since very early times, but scientific agriculture, though receiving much attention, is still in its infancy. One of the greatest problems facing the Union Government—comparable with that of stamping out the animal diseases which so greatly retard the development of the pastoral industries—is the development of agriculture in the face of the necessity for extensive *irrigation* schemes. Much of the land is naturally fertile but, without irrigation, must remain unproductive, while each year the uncontrolled flood water of the rivers washes vast quantities of the best soil into the sea. Unfortunately the problem is rendered the more difficult by the character of the rivers, which, on the veld, flow in deep channels, and by the difficulty of obtaining subterranean water. Throughout the Union, however, large numbers of irrigation works have been constructed or schemes instituted, and the expenditure of considerable sums of money has resulted in extensive areas being made fit for cultivation. Irrigation Acts have been passed to ensure proper control and conservation of water supplies, and an Irrigation Department under a Director of Irrigation, with a

staff of engineers, considers schemes and applications for loans. Irrigation Boards established throughout the country have been responsible for most of the irrigation development, which, in Cape Province and Natal, usually takes the form of damming the rivers and, in the Orange Free State and Transvaal, of the construction of "dams," or tanks, in much the same way as in India, to store up the surplus water which would otherwise run to waste, carrying with it much of the soil. In addition, large numbers of artesian bores have been drilled and many more are being put down.

MAIZE (mealies) is by far the most important crop of the country. It not only constitutes the chief food of the Kaffirs, but is an important export. It is cultivated in enormous quantities in the Orange Free State, but the Transvaal also is a large producer, while Natal and Cape Province both grow considerable quantities. "The maize zone in South Africa may be said to possess two distinct and valuable advantages over the famous corn belt of the United States. The growing season is longer by from four to seven weeks, and this makes the season for planting a considerably longer one. Again, the drier atmospheric conditions in the Union produce a grain with a lower moisture content; and this grain, being thereby less liable to injury during transit, is more suitable for export, as well as for manufacturing purposes. The rainfall is sufficient if the soil is well cultivated, and the soil itself is of good quality throughout, and quite excellent in parts. Labour is fairly plentiful and cheap; an expanding home market, fairly well served by the railway, is close at hand; and an assured and readily accessible market oversea, with cheap rates of transportation to Union ports and by ship, is being organised under the special direction of the Government."¹

WHEAT is grown principally in the Mediterranean region of Cape Province, where the chief centres are *Paarl*, *Malmesbury*, and *Caledon*. Considerable quantities are grown in the Orange Free State and Transvaal, but the wet summers of Natal are unfavourable to the crop, and only in the upland districts of this province is it grown at all, and that in but small quantities. The wheat production of the Union is now almost sufficient for local requirements.

BARLEY, OATS, and RYE are grown in the wheat districts, but on an even smaller scale. In the cattle-rearing districts oats are grown as fodder.

LUCERNE, a species of clover, also is a fodder crop. It is grown in irrigated districts, especially on the Little Karroo, where it is used largely for feeding the young ostriches.

¹ The Official Year-Book of the Union of South Africa.

FRUITS are extensively grown throughout the Union, and though the local consumption is very great, fruit-growing is a potential source of trade. Many kinds of fruit are produced, a wide range being made possible by the variations of altitude, and, consequently, of climatic conditions. There is a growing export of *fresh* fruit, governed by the Fruit Export Act, 1914, which aims at maintaining a high quality in all fruit exported. In 1921 the South Africa Fruit Growers Exchange was instituted for the proper organisation of the trade, which is encouraged by the provision of central depôts for collecting, packing, and cold-storing the fruit until it can be shipped in fast liners, provided with refrigerated chambers, for conveyance to London, where its arrival coincides with the period of greatest scarcity of fruits grown in the northern hemisphere, and precedes by some weeks that of the fruit from other countries of the southern hemisphere. Also, *dried* fruits are produced for home consumption throughout a large portion of the Union and, for export, chiefly in the south-west of Cape Province, while *canned* fruit is steadily becoming an important product. Canneries have been established, chiefly in towns near the coast, notably at *Durban*, *Port Elizabeth*, and *Cape Town*.

The *vine* is cultivated in the Mediterranean region of Cape Province, principally in the rich lands round *Paarl*, *Worcester*, *Stellenbosch*, and *Malmesbury*, and *grapes*, *raisins*, *wine*, and *brandy* are exported. The South African wine industry shares with that of Australia the difficulty of overcoming the prejudice in favour of the old-established European wines, but steady progress is being made, and the export to Britain is increasing. The coastal region of Natal produces *bananas* and *pine-apples*, and on the higher lands in the interior of the province, as well as in Cape Province, such fruits as *plums*, *pears*, *apples*, *apricots*, *peaches*, *oranges*, *lemons*, and *melons* are cultivated.

TOBACCO, of, which there is a large local consumption, is grown widely throughout the country. Virginia leaf is cultivated chiefly in the *Pretoria*, *Rustenburg*, *Marico*, *Potchefstroom*, and *Piet Retief* districts of the Transvaal, and the *Piquetburg* and *Oudtshoorn* districts of Cape Province. In this province, also, Turkish leaf is cultivated, in the Mediterranean region of the south-west, the chief centres being *Stellenbosch*, *Wellington*, and *Tulbagh*. At present the bulk of the exported tobacco goes to South-West Africa, Rhodesia, and other neighbouring territories, but there is an increasing export to Great Britain, encouraged by the preferential tariff extended to Empire tobacco.

SUGAR CANE is becoming of increasing importance on the sub-tropical coastal plain of Natal (including Zululand), and in 1924-25 the yield was 161,250 tons. There is, however, a large local consumption and the export is still small. Numerous sugar factories are in operation, and the industry has become

one of the most prosperous rural industries of the country. New areas are being opened up and established areas are being worked more intensively, while fresh capital is being invested in many of the factories in order that more modern machinery may be installed. The industry has one great drawback however; the canes take two years to mature as against one year in tropical countries, and this means that twice the area required in the tropics must be cultivated to obtain the same output. Also, the local labour supply is inadequate and recruiting has to be carried on outside the territory. On most of the estates Indian coolies are employed, Europeans acting as overseers and managers.

COTTON is now receiving serious attention in the Union, and, as the plant is a better drought-resistant than either maize or tobacco, many farmers are taking up its cultivation. There is a plentiful supply of cheap native labour, the climate is favourable, excellent shipping facilities exist, and, though the internal transportation costs may prove a handicap, the industry should have a bright future. At present the chief cotton-growing areas are the coastal region of Natal and Zululand, and the Rustenburg district of the Transvaal, but Zululand has proved too malarial and Rustenburg too dry for the easy production of cotton, and the industry is being fostered in the eastern district of Cape Province as a result of the activities of the East London Cotton Growers' Association. The yield increased from 800,000 lbs. in 1917-18 to 20,391,818 lbs. in 1925.

TEA is cultivated over an area of 3,130 acres, out of an estimated possible area of 15,000 acres, and in 1924-25 over 4 million lbs. of green leaf were produced. The plant is cultivated, with the aid of cheap, skilled Indian labour, on the coastal lands of Natal, but most of the crop is consumed in South Africa, and as, in addition, the taste is unlike that of other teas, the export is still small.

Minerals.

To speak of gold and diamonds is to speak of South Africa, and to the world at large the importance of the Union as a mineral producer is due to its being the most important gold-mining country in the world and practically the only source of diamonds. The part played by minerals in the history of the country is, therefore, a very great one; indeed, the modern history of South Africa may be said to have begun with the discovery of diamonds in 1871 and of gold in the following year. These epoch-making discoveries certainly led to grave political troubles, but it is equally certain that had they never been made, the Union of South Africa, instead of being a wealthy and powerful nation, might never have been a nation at all, and would

certainly have been of comparatively little importance in the world of to-day. "All through South African records can be traced the history of large territories gradually being occupied by white races struggling for years to hold their own, and all being helped forward at some period or other by the discovery of payable minerals with the attendant influx of capital and general increase in trade."¹

GOLD.—It is calculated that from the earliest dates of existing records to the end of 1925, the gold mined in the Union was worth £876,422,746, and that of this stupendous total the Transvaal accounted for £876,314,625, the balance being contributed by Natal and Cape Province. The Transvaal is, indeed, by far the greatest gold producer in the world, the annual average production during the five years 1921-25 being over £40,500,000, and it is estimated that in 1926 this province produced about 50 per cent. of the world's total output. Nearly all the gold is obtained from the eastern end of the Witwatersrand, or the Rand as it is called, in a district extending some 50 miles to the east and west of *Johannesburg*, the great centre of the industry. The gold-bearing strata of this region are formed of a conglomerate ("banket") composed of quartz pebbles bound together with a siliceous cement, in which the gold occurs in minute particles invisible to the naked eye. Hence powerful and expensive machinery and much labour are required for its extraction, and the operations are beyond the scope of individual prospectors and must, of necessity, be conducted by great mining companies. The manual work in the mines is performed by natives, of whom there are some 200,000, under white supervision, the proportion being about nine natives to one white man. The natives, who are recruited from every part of the Union and from Portuguese East Africa, live in "compounds" attached to the mines and are "kept" by the mining company during the period for which they have signed on. As a rule they rarely enter into a fresh contract when their period is up, preferring to return to their homes and live in idle "luxury" until, after several years, their economic circumstances again compel them to seek work.

Though the Rand mines are by far the most important, there are other valuable mining areas in the Transvaal. Of these the most important are the *Pilgrim's Rest*, *Barberton*, *Heidelberg*, and *Klerksdorp* districts, where the quartz reefs are worked by wealthy companies, as are the conglomerate reefs of the Rand. There are no alluvial gold diggings in the Union and, consequently, the opportunities for the private prospector are small.

DIAMONDS.—The diamond mines rank next to the gold mines in the value of their output, but this varies considerably according to the state of the market, it being the wise policy of the

¹ Official Year-Book.

South African companies to restrict the output when demand is low, and so maintain the value of diamonds. Thus, while in 1922 £2,266,631 worth of diamonds were produced, in that year coal ranking second by order of value, in 1925 the diamond output was £8,198,128, exceeding that of coal by £4,336,010.

The chief fields are situated in the north-eastern part of Cape Province, where *Kimberley* is the great centre of the industry; in the neighbouring Orange Free State districts round *Jagersfontein* and *Koffiefontein*; and in the Transvaal, round *Pretoria*. The operations are carried on by wealthy mining companies—the great De Beers Company being the chief—which employ large numbers of natives for the great amount of manual labour necessary in digging out the blue clay (“blue”) in which the diamonds are found embedded. This clay consists of hardened volcanic mud, and is found in pipes, usually oval in form, which pierce the overlying strata. The “blue” is mined by means of shafts sunk in the ordinary way, and is then exposed on great open spaces, or “floors,” to dry and crumble in the sunshine and rain. Here it remains for a long time, sometimes as long as a year or more, fenced in by barbed wire entanglements and closely guarded by armed sentries. It is then removed and washed in revolving pans and the diamonds are picked out from the deposit. The natives live in compounds, as in the gold-mining areas, and very strict vigilance is necessary to prevent theft. The cutting of the stones, before which they look, to the untrained eye, much like ordinary pebbles, is done chiefly in Antwerp and Amsterdam, and most of the output is sent to these centres.

COAL.—The average annual production of coal for the period 1921-25 was valued at nearly £4,000,000, and the coal resources of the Union of South Africa are very great. By far the most extensive and productive fields are in the Transvaal, at *Witbank* and in the neighbourhood of the Rand, at *Vereeniging* and *Boksburg*. Next in order are the fields of Natal, large supplies being obtained from the mines of the *Newcastle* and *Dundee* districts; and lesser quantities are mined in the north of the Orange Free State, south of *Vereeniging*, and at *Vierfontein*, and in Cape Province at *Indwe* and *Molteno* in the *Stormberg Range*. The coal production is much more than sufficient to supply the needs of the country, and a considerable export trade has developed, large quantities being shipped from *Durban*, either for bunkering purposes or for export to other South African and Indian Ocean ports. *Durban* is connected by rail with the rich mines of Natal and the Transvaal, and is thus the great coal port of the Union. The cheap native labour, the ease with which the coal is obtained (no Transvaal mine being deeper than 300 feet and much coal being obtained by adit mining), and the utilisation of coal-cutting machinery combine to make the pit-mouth price of

South African coal as low as any in the world. Much of the coal, especially that of Natal, is of excellent quality, and the cheapening of railway freight rates should do much to encourage its sale overseas.

COPPER.—By value of output copper is the fourth most important mineral produced, but it falls a long way behind the others, the annual average output during 1921-25 being valued at only £298,922. The chief mines are at *Ookiep* and *Concordia*, south of the Orange River in the north-west of Cape Province, the ore from which is carried by rail some 80 miles to *Port Nolloth* for export. In the Transvaal copper is mined at *Messina*, near the Limpopo River. In the early days this mine was frequently shut down owing to all hands suffering from malaria, but stringent precautions have been taken and the conditions have now greatly improved, and the mine promises to become an important producer.

TIN.—The tin deposits of the Union are of comparatively recent discovery, and the production is still small. The Transvaal is the chief producer, the metal being mined at *Rooiberg* and *Leeuwpoort*, where very extensive ancient workings exist.

OTHER MINERALS.—Many other minerals are found in the Union, but few are, as yet, of much economic importance. Rich *platinum* deposits have recently been discovered in the Lydenburg, Waterburg, and Rustenburg districts of the Transvaal, and these may prove of great value. *Asbestos* is mined chiefly in the Prieska and Hay districts of Cape Province and the north Lydenburg and Carolina districts of the Transvaal. *Corundum* is worked in the Zoutpansberg and Barberton districts of the Transvaal. *Salt* is obtained in many parts, chiefly in pans or lakes by solar evaporation of the brine. *Iron ore* occurs in several parts, notably in the Vryheid district of Natal and to the north of Pretoria, in the Transvaal, but the deposits lie practically untouched. Finally, each of the provinces produces such products as sandstone, granite, cement, and bricks.

Manufactures.

“South Africa depends, and must for a long time to come continue to depend, mainly upon the two basic industries of agriculture and mining. The present state of development which has been reached is based upon these two industries; and although manufacturing industries have attained importance and should be fostered by every means which may prove to be effective, the fact remains that the mainstay of the country is, and the prospects of development are mainly dependent upon, the production of food, minerals, and raw materials for local consumption and for export. For the products of its primary industries, agriculture and mining, South Africa to yet a great

extent looks to a world-market. The same as yet cannot be said of the manufacturing industries.”¹ Some of the manufacturing industries of export-importance in connection with agriculture, such as the preparation of wine and brandy, fruit-canning, sugar-refining, and wool-washing, have already been mentioned. Apart from these and other manufactures similarly concerned with the preparation for export of the products of the agricultural and pastoral industries, *e.g.*, tobacco, cotton, wattle bark extract, the manufacturing industries are mainly of local importance. Most of the large towns have factories supplying the local demand in such goods as biscuits, jams, soap, candles, furniture, and beer, and there are numerous tanneries and saw-mills. Explosives, both for use in the mines and in fire-arms, are made near Johannesburg, at Somerset West, and near Durban; there are important railway workshops at Pretoria and Uitenhage; and vehicles (carts and wagons) and harness are made in many parts.

COMMUNICATIONS

As the natural means of communication in South Africa are bad, the rivers with their intermittent torrents being useless for this purpose and the broken nature of much of the country making the construction and maintenance of roads a matter of great difficulty, the importance of the railways is very great.

Railways.

The railway development of South Africa scarcely affected the country before 1870, because up to that time the economy of the country rested almost entirely on animal products, and the penetration of the interior depended on the walking and carrying capacity of animals. But as soon as South Africa began to base her economic life on diamonds and gold, which meant a demand for heavy machinery and supplies for mining camps, railway expansion and inland expansion became almost interchangeable terms. Inadequate progress was made under private enterprise, and all existing lines in the Cape were bought up by the government of that colony in 1873. The government of Natal followed suit and put in hand a more comprehensive system of railway routes, and, as a result of the competition of the coastal colonies for the transit trade of the mining areas, five main lines were constructed linking Cape Town, Port Elizabeth, and East London (in Cape Colony), Durban (in Natal), and Lourenço Marques (in Portuguese East Africa) with the mining centres. To-day these ports are the great gateways of

¹ From the Report of the Committee appointed to consider the economic policy of the Union.

the country's trade; through them pass the bulk of the imports and exports, each serving its own hinterland and each participating to a greater or less degree in the trade of the interior, to which all have access. Gradually the unification of the railways of South Africa was brought about, and in 1910 all the lines were combined, as are the Union harbours, under Union control. The total mileage at the end of March, 1926 was 12,002 miles, of which 11,017 are of 3 feet 6 inch gauge and the remainder 2 feet gauge. The most important lines of the South African Railways are as follows (Fig. 34):—

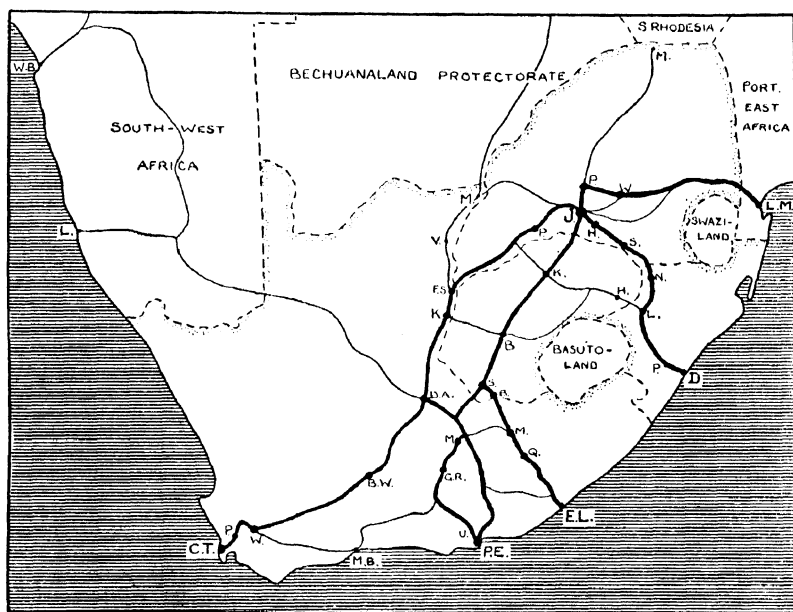


FIG. 34.—THE PRINCIPAL RAILWAYS OF THE UNION OF SOUTH AFRICA.

1. From *Cape Town* a line runs through *Paarl* and *Worcester* to *Beaufort West* on the Great Karroo. It then skirts the Nieuwveld Range and climbs the escarpment of the High Plateau *via* the Hex River Pass, running across the veld to *De Aar Junction*, whence there is a line connecting with the railways of South-West Africa. Proceeding northwards, the line crosses the Orange River near *Hopetown* and runs *via* *Kimberley* and *Fourteen Streams*, where it crosses the Vaal River, to *Potchefstroom* and *Johannesburg*. From *Fourteen Streams* the line continues north *via* *Vryburg* and *Mafeking*, beyond which it passes out of the Union, running through Bechuanaland Protectorate to *Bulawayo* in Southern Rhodesia.

2. From *Port Elizabeth* a line runs *via* *Uitenhage*, *Graaf Reinet*,

and *Middelburg* to *Springfontein*, in the Orange Free State, where it unites with the line from East London.

3. From *East London* a line runs via *Queenstown*, *Molteno*, and *Bethulie*, where the Orange River is crossed, to *Springfontein*. From here the line runs via *Bloemfontein*, the capital of the Orange Free State, and *Kroonstad* to *Johannesburg*.

4. From *Durban* a line runs across the Drakensbergs to *Johannesburg*, passing via *Pietermaritzburg* (the capital of Natal), *Ladysmith*, *Newcastle*, *Standerton*, and *Heidelberg*. From *Ladysmith* an important branch of this line runs over Van Reenen's Pass to *Harrismith*, in the Orange Free State, whence lines connect with the route from Port Elizabeth and East London at *Kroonstad* and *Bloemfontein*.

The map shows very clearly the importance of *Johannesburg* as the great railway centre of the Union. In addition to the lines converging on it from the Union ports, there is an important line from *Lourenço Marques* (Portuguese East Africa) via *Witbank* and *Pretoria*, the administrative capital of the Union, which provides the most direct route from the Transvaal to the Indian Ocean, and there is also a line running north via *Pretoria* to *Messina*, in the Limpopo valley.

COMMERCE, PORTS AND INLAND TOWNS

Of the *exports*, by far the most important are *gold* and *wool*, followed by *diamonds*, *maize* and *maize meal*, *hides* and *skins*, *wattle bark*, *coal*, and *mohair*, others of less importance being *fish*, *meats*, *ostrich feathers*, *butter*, *tobacco*, and *wines*. The relative importance of the principal exports is shown by the following figures for 1925:—gold, £34,337,506; wool, £15,095,446; diamonds, £8,605,525; maize, £6,489,225 (including maize meal, £819,820); hides and skins, £2,870,755; wattle bark, £1,109,161; and coal (excluding bunker coal worth about £2,500,000), £1,071,393. The *imports* consist mainly of *food and drink*, including such items as wheat and wheat flour, rice, fish, tea, coffee, and cocoa, and *manufactured goods* of all kinds, of which the principal items are clothing and textile goods, vehicles, machinery, hardware and cutlery, electrical wire and fittings, agricultural implements, rubber manufactures, leather goods (chiefly boots and shoes), printing paper, stationery and books, and drugs and chemicals. Also large quantities of timber are imported.

Of the total exports of merchandise, valued in 1925 at over £82,500,000, goods to the value of over £48,500,000 were taken by the United Kingdom, over £16,500,000 went to the rest of the Empire, and about £2,500,000 to the United States. The United Kingdom is also the greatest source of imports, in 1925 supplying goods to the value of over £33,300,000 out of a total import

of merchandise valued at £66,200,000. In that year the remainder of the Empire supplied goods to the value of nearly £8,500,000, and the United States nearly £10,000,000.

The ports of Cape Town, Durban, Port Elizabeth, and East London share the bulk of the trade, though the Portuguese East African port of Lourenço Marques takes a certain proportion of the Transvaal trade.

CAPE TOWN, the capital of Cape Province and the legislative capital of the Union, lies between Table Bay and the north base of Table Mountain, which affords shelter from the south-easterly winds. Its harbour is not naturally a good one, but large sums of money have been expended in the construction of docks, wharves, and a breakwater, and it is now of first-class importance, being connected by rail with all parts of South Africa. Originally established as a revictualling station for the Dutch East India Company's boats plying between Holland and the East Indies, Cape Town is still of great importance as a port of call. Besides being the first port touched at by the regular liners serving South Africa, it is much used by ships rounding the Cape of Good Hope to and from Australasia or the East, both for revictualling and bunkering. It is the chief port for the landing and embarkation of passengers and mails for the whole of the Union, and is the outlet not only for the produce of its immediate hinterland, *i.e.*, for wool, feathers, wheat, fruit, and wine, but for most of the gold and diamonds from the Kimberley and Pretoria mines. In addition it is a whaling and fishing centre.

Simon's Town, situated on False Bay, behind Table Mountain, is important as the naval base of the British fleet in South African waters.

DURBAN, or Port Natal, is the first port of South Africa both as regards volume of trade and facilities for shipping, and is the only port of any importance on the south-east coast. Its harbour is much better than that of Cape Town, the port being situated on an almost landlocked lagoon having a deep-water entrance practicable for the largest vessels at all states of the tide. The facilities for shipping are excellent, there is deep water alongside the quays, and the port has the further advantage over Cape Town of having plentiful local supplies of coal. It is the nearest British port to the Orange Free State and the Transvaal, and does a great trade in wool, maize, wattle bark, hides and skins, and coal. Its import trade, too, is great, as it receives the bulk of the goods consigned to the two inland provinces. Further, it carries on a considerable entrepôt trade with Portuguese East Africa and Mauritius and is an important fishing port.

PORT ELIZABETH, situated on Algoa Bay, has few natural advantages as far as its harbour is concerned. The roadstead in which the vessels have to anchor, almost all the tonnage

handled being landed and shipped by lighters, is exposed to the full force of the south-easterly winds, which, at certain seasons of the year, become severe gales. The port is, however, the outlet for a rich pastoral and agricultural district and does a large trade in wool, mohair, hides and skins, and ostrich feathers.

EAST LONDON, at the mouth of the Buffalo River, the lower reaches of which make a fairly good harbour, has, like Port Elizabeth, a rich agricultural and pastoral region for its hinterland. It is chiefly important as a wool port.

JOHANNESBURG, in the Transvaal, with a white population of 170,543, is the largest town in South Africa. It is an important railway centre, and the centre of the famous Witwatersrand gold mines. Local industries, *e.g.*, printing, brickmaking, brewing, tobacco-manufacturing, and iron founding, are numerous.

PRETORIA is the capital of the Transvaal, the seat of the executive government of the Union, and a trading centre of no mean importance.

PIETERMARITZBURG is the capital and seat of government of the Province of Natal, and BLOEMFONTEIN performs the same functions for the Orange Free State.

POPULATION

No account of the economic geography of the Union of South Africa would be complete without some reference to the population of the country, for the coloured races, the Kaffirs, outnumber the whites, comprising both Dutch and English, by about four to one, and the "colour problem" thus created is one of the biggest problems the Government has to face. "Native labour is often spoken of as the chief asset of South Africa. To many on the other hand it constitutes the greatest problem. The minor problem relating to the small body of Asiatics in Natal and the Transvaal is a complication, but an entirely different matter, having arisen as the result of importing indentured labour. The South African native on the other hand is the original inhabitant. Outnumbering the white population many times there could be no conceivable policy of making South Africa a white man's country in the full sense of being self-supporting and independent of the native for all kinds of manual labour. But, on the other hand, the proportion of the white population is far too great to admit of their being merely supervisors and managers. The grave problem of finding occupation and maintenance for the poorer, less educated, less efficient section of the white population, confronts the politician of whatever party, and seems wellnigh insoluble. Every line of thought tends ultimately to double

back and form a circular argument.”¹ As a result of this, the field for white labour is greatly restricted, and there is a tendency to limit the increase of white settlers to those possessing sufficient capital to engage large numbers of natives for plantation work. The white trade unions endeavour to suppress any attempts the blacks make at economic betterment, while the Union is self-governing only as regards the white population. Europeans, between whom and the natives there is a marked cleavage, consider it undignified to do any work which might be performed by a native, or to associate with them in any way whatsoever. It must, however, be realised that the “colour problem” has to be faced and solved, for the natives of South Africa, unlike the aborigines of Australia or the Indians of Canada, who are gradually dying out, are increasing in numbers by natural increase much more rapidly than is the white population by natural increase and immigration, and the problem inevitably becomes more serious every year.

TERRITORIES UNDER THE SOUTH AFRICAN HIGH COMMISSION

BASUTOLAND

BASUTOLAND consists of an inland mountainous region comparable with Switzerland in Europe, lying between the Orange Free State, Natal, and Cape Province, at the head of the Orange River. The territory, enclosed by the Drakensberg Mountains, is well watered and has a good climate. It is considered to be the best grain-growing country in South Africa and the abundant grass enables large herds of cattle to be reared by the natives, who form practically the entire population. The chief products of export importance are wool, mohair, wheat and wheat-meal, maize and maize-meal, cattle, and horses. The territory is governed by a Resident Commissioner under the High Commissioner for South Africa, the centre of administration being *Maseru*, the capital.

BECHUANALAND PROTECTORATE

The Bechuanaland Protectorate, stretching from the Orange River to the Zambesi, is bounded on the south and east by the Union of South Africa, on the north-east by Southern Rhodesia, on the north by the Zambesi and Chobe Rivers, and on the west by South-West Africa. The country forms part of the South

¹ Report on the Economic Conditions in South Africa, 1924. (Department of Overseas Trade.)

African plateau. The climate is fairly healthy, and while in the east there is a moderate rainfall and grass-land is prevalent, towards the west the rainfall diminishes and the country passes into the Kalahari Desert, where it is sandy and waterless. The population is composed almost entirely of natives engaged in pastoral occupations, cattle, sheep, and goats being reared in large numbers in the less arid regions. Maize and Kaffir corn are grown, but the rainfall is generally too small and uncertain for agriculture. The presence of old and well-defined river courses indicates that at one time the country was well watered, and it is believed that considerable supplies of underground water exist. The protectorate is over three times as large as Great Britain and is administered from Mafeking, in Cape Province. The railway between Kimberley and Rhodesia traverses the Protectorate.

SWAZILAND

Swaziland is bounded on the north, west, and south by the Transvaal, and on the east by Portuguese East Africa and Natal. The country consists of three regions, known locally as the *high*, *middle*, and *low veld*, of roughly equal breadth running from north to south: on the west the high veld is a mountainous region, rising to an altitude of over 4,000 feet, the middle veld lies some 2,000 feet lower, and the low veld has an average height of about 1,000 feet. The climate, malarial on the low veld, improves with increase in altitude, and, as the high and middle velds are very well watered and the soil fertile, the natives, Swazis, who form almost the entire population, are able to produce large crops of maize, tobacco, millet, pumpkins, ground-nuts, beans, and sweet potatoes, and cotton is being extensively cultivated. Pastoral occupations also are important, there being large numbers of sheep, goats, and cattle, and each year about 350,000 sheep are driven into Swaziland from the Transvaal for the excellent winter grazing. The mineral wealth of the country is believed to be great, but it has not as yet been systematically prospected; though alluvial tin is worked and there are a few small gold mines. The exports consist chiefly of *tin*, *slaughter cattle*, *tobacco*, and *cotton*. The headquarters of the Administration is at *Mbabane*, the capital, a small village situated in the hills overlooking the middle veld.

SOUTH-WEST AFRICA

This territory, the former German South-West Africa, is administered by the Union Government under a mandate from the League of Nations. It has an area about three and a half times as great as that of Great Britain, and is peopled chiefly by natives. As the country forms the continuation towards the

Atlantic of the Union of South Africa, it receives but a scanty rainfall and is chiefly a desert region not capable of much development. Physically it consists of a sandy coastal plain, where the rainfall is less than one inch a year, from which the land rises by a series of plateaux, varying in height from 2,000 feet to 7,000 feet, and then falls away towards the east, merging into the Kalahari Desert plateau. The plateaux also slope gradually to the north and south. Inland the altitude of the land causes a small rainfall of from 12 inches in the central districts to about 22 inches in the northern, and inside the coastal desert belt in the south there is a succession of long, undulating, grassy plains which merge into Karroo vegetation. In the north the land is covered with dense bush having an undergrowth of grass. The climate, though hot and dry, is very healthy, except in the north, where malaria is prevalent.

The country is best adapted for pastoral industries, for though agriculture can be carried on in the north, the crops are always liable to suffer from drought. The chief occupations are, therefore, *cattle* and *sheep* rearing, the former being most numerous in the northern areas and the latter in the southern. Mining, however, is important, and small but very good quality *diamonds* are found along the coast from the Orange River to Conception Bay. Other minerals worked include *copper*, rich deposits of which exist in the neighbourhood of Tsumeb, *vanadium*, *marble*, and *tin*.

Considering the great obstacles which exist to economic development, the country is well supplied with railways. The line from De Aar Junction, in Cape Province, crosses the Orange River at Upington and enters South-West Africa at Nakob. It proceeds northwards through the sheep rearing districts to the capital, *Windhuk*, and continues to the copper-mining centres of *Otavi*, *Tsumeb*, and *Groolfontein*, in the north, branch lines running from Seeheim to *Luderitz Bay*, in the south, and from Karibib to *Walvis Bay*. *Luderitz* has a well-sheltered harbour with a good anchorage but has not developed since the British occupation. It owes its importance to the diamond industry. *Walvis Bay*, a British possession since 1878, also has a natural and well-sheltered harbour, and has undergone considerable development since the former German port of Swakopmund, 20 miles to the north, has been permanently closed. The future of *Walvis Bay* depends on many factors however; chiefly whether the great regular lines of steamers running to South Africa will use it for the shipment of chilled meat, a trade it might well develop, and to what extent the mineral export can be developed. The chief exports, at present, are *diamonds*, *copper*, and *hides*, but others, notably beef, wool, and mohair, may become important.

RHODESIA

Rhodesia includes all the region of the South African plateau extending northwards from the Transvaal to the Belgian Congo and Tanganyika Territory, bounded on the west by Bechuana-land, Portuguese West Africa, and the Belgian Congo, and on the east by Portuguese East Africa, Nyasaland, and Tanganyika Territory. The country lying to the south of the Zambesi River is known as Southern Rhodesia, and that to the north as Northern Rhodesia. Until 1923 both were under the administration of the British South Africa Company, but in September of that year Southern Rhodesia was formally annexed to His Majesty's Dominions, having voted for responsible self-government, and in April, 1924 the Company was relieved also of the administration of Northern Rhodesia, which is now a British Protectorate.

SOUTHERN RHODESIA

Southern Rhodesia, the better known of the Rhodesias, lies mainly on a high plateau bounded on the north by the Zambesi and on the south by the Limpopo. The greater part of the country has an elevation of over 3,000 feet, but a considerable area, running from south-west to north-east and forming the divide between the two rivers, is from 4,000 to 5,000 feet in height. Only in the north and south, where the land slopes to the river valleys, is the elevation less than 1,000 feet. Thus, in spite of the fact that the country lies within the tropics, it enjoys a temperate climate and, in those parts above 4,000 feet, is admirably suited for development and settlement by Europeans. In lower parts, from 3,000 to 4,000 feet in height, white people are liable to contract malaria, but when the land has been cleared and drained it will probably be suitable for settlement. Only in the regions below 3,000 feet, the undeveloped forest and savannah regions around the middle portion of the Zambesi, is the white man never likely to settle. The rainfall occurs during the summer months, almost entirely between the beginning of November and the end of March, and varies from between 30 and 40 inches over the greater part of the north-east (Mashonaland) to between 20 and 30 inches in the south-west (Matabeleland). The land is thus well adapted for agricultural and pastoral industries; arable farming being most successful in Mashonaland, owing to the heavier rainfall. Large areas are devoted to the cultivation of *maize*, *cotton*, and *tobacco*, and these are the principal crops, but ground-nuts and winter wheat also are grown. Large fruit orchards have been planted, as it has been found that nearly all fruit trees thrive, and the cultivation of *oranges* and *lemons* constitutes a rapidly expanding industry. At present, however, the country is, from an agri-

cultural point of view, most important for stock-rearing, and in 1925 there were over two million *cattle*. It is, indeed, an ideal cattle country, as there is an abundance of natural grasses and no cold season to necessitate the provision of shelter. The *dairying* industry is well established, slaughter cattle find a ready market in the Transvaal, and, in time, an export trade in chilled meat may develop if railways are opened up to the west coast. In addition to cattle there are nearly 350,000 sheep. A beginning has been made at pig-breeding and bacon factories have been established.

In spite of the importance of agricultural and pastoral industries, however, *mining* provides the bulk of the exports and is, at present, the chief stimulus to the opening up of the country. Of the many minerals found, *gold* is the most important. It occurs widely in reefs, but chiefly in the elevated region which forms the south-eastern watershed of the Zambesi, where it is mined in the *Bulawayo*, *Gwelo*, *Victoria*, and *Umtali* districts. In 1925 the output was 581,504 ounces, valued at £2,539,542, most of which was exported. In the order of value of output, follow *asbestos*, mined chiefly near *Victoria*; *chrome ore*, of which there are rich deposits at *Selukwe*; *coal*, which is believed to be widespread but which at present is mined chiefly at *Wankie* for use on the railways and at the mines; and *copper* found in many parts but mined chiefly at *Umkonda*. Other minerals worked in smaller quantities include *silver* and *lead*, which are found in considerable quantities in conjunction with gold in the Umtali district, *mica*, *arsenic*, *tin*, *tungstic*, *iron*, *diamonds*, and *antimony*.

Manufacturing industries are few and of minor importance. They consist chiefly of factories dealing with the agricultural and pastoral produce, and there are several creameries, oil-expressing mills, and bacon factories run on co-operative lines by the Rhodesian Farmers' Co-operative Industries, Limited. In the cotton-growing districts ginneries have been established, and there are maize-flour mills run in conjunction with the plant producing maize oil, which is used as a salad and cooking oil and also in the manufacture of soap. Other industries are tanning, cement-, candle- and biscuit-making and the manufacture of sheep dip.

The population of the country, which is not quite three times as large as England, is composed chiefly of natives, but the number of Europeans, nearly 40,000 in 1926, is increasing as the opportunities which the region has to offer become more widely known. The chief towns are connected by the Rhodesia Railways, the southern section of which, from Vryburg to Bulawayo, is operated by the South African Railways. At *Bulawayo*, in Matabeleland, the most important railway centre and the site of the principal railway workshops, the railway divides into two main lines. One, forming with the line from Cape Town the

southern section of the projected *Cape to Cairo* route, continues northwards to the Zambesi through the *Wankie* coalfield and crosses into Northern Rhodesia near the great Victoria Falls. Proceeding northwards through *Broken Hill* it passes out of British territory over the Belgian Congo boundary to its present railhead some distance north of *Bukama*. The second line from Bulawayo runs north-eastwards through *Gwelo* to *Salisbury*, the capital, a fine town possessing all the advantages of civilisation, and at various points en route branches leave the main line to serve the more important mines. From Salisbury the line continues south-eastwards and runs through *Umtali* into Portuguese East Africa, terminating at the port of *Beira*, through which port most of the Rhodesian trade passes.

The trade is principally with Great Britain, all the goods required which can be supplied by the Mother Country being purchased from her. The *imports* consist chiefly of textiles, wearing apparel, boots and shoes, iron and steel goods, machinery, railway and tramway materials and locomotives, and some provisions and beverages; while the principal *exports* are gold, asbestos, chrome ore, copper, animals, maize, and tobacco, together with a comparatively small but increasing amount of cotton.

NORTHERN RHODESIA

Northern Rhodesia, like Southern Rhodesia, consists for the most part of high plateau country, but vast tracts are as yet but imperfectly known, and of a population of over 1,145,000, Europeans number only about 4,500. In area it is almost twice as large as Southern Rhodesia, and much of the area is suitable for grazing and agriculture, but the temperature is relatively high and this, combined with the abundant rainfall (over 40 inches in the north and north-east), makes the country less suitable for white settlement than Southern Rhodesia. *Maize*, *tobacco*, *cotton*, *wheat*, and European *fruits* are cultivated, but stock-raising is more important than agriculture and considerable numbers of *cattle* are kept. The cattle and much of the agricultural produce of the farmers find a ready market in the mining towns of the Katanga, in the extreme south of the Belgian Congo. The best farming areas are found along and near the railway line between *Livingstone*, the seat of government and a tourist centre for visitors to the famous Victoria Falls, on the Zambesi, and *Mwomboshi*. Farther to the north are large areas, well watered and with rich soil, but which are unfortunately infested with tsetse fly, whose bite is fatal to cattle and horses. In certain regions the country is highly mineralised, and especially large deposits of *copper*, *coal*, and *iron* have been discovered. *Copper* is mined at *Bwana M'Kubwa*, and in the region of Kafue River. At present the output is small (75 tons in 1925), but as

the deposits are rich and of great extent they should give rise to a great mining industry. *Lead* and *zinc* are mined at *Broken Hill*, 3,352 tons of lead and 236 tons of zinc and 6,199 tons of the ore being produced in 1925. Other minerals mined are *silver*, *gold*, and *vanadium*, the coal and iron deposits still awaiting exploitation.

Away from the railway, transport is almost entirely by native carrier, as the presence of the tsetse fly prohibits the use of animals over large areas. In the whole of the territory there is nothing which might be classed as a town in the European sense of the word. After *Livingstone*, the most important centres are *Broken Hill*, on the railway, about 50 miles south of the northern border; *Fort Jameson*, on the frontier with Nyasaland; and *Abercorn*, near the southern end of Lake Tanganyika. The chief exports are *minerals* (lead, zinc, copper, gold, and silver), *tobacco*, *live animals*, *maize* and *maize flour*, *hides*, *skins*, and *horns*, and *ivory*. Provisions and manufactured goods are the chief imports.

NYASALAND

Nyasaland is a British Protectorate lying along the western and southern shores of Lake Nyasa. On the north it is bordered by Tanganyika Territory, on the west lies Northern Rhodesia, and its southern portion extends into Portuguese East Africa. Covering an area about as extensive as Scotland and Wales combined, it is populated almost entirely by natives, of a total population of 1,200,000, there being less than 1,500 Europeans.

The whole region is elevated and, in spite of the low latitude in which it lies (10° S. to 17° S.), experiences a not excessive temperature. In the hotter months, *i.e.*, during the northern winter, there is an abundant rainfall, but the cooler months are dry. The vegetation is principally of the savannah type, with woods in the valleys and on the slopes of the mountains, and the country is capable of much agricultural development.

Inadequate means of communication are, however, a great drawback, for while good roads are being made in all directions only in the south has railway construction been undertaken. There is a line running from *Blantyre*, in the Shiré Highlands, the chief settlement, through *Port Herald*, on the Shiré River, to *Chindio*, on the Zambesi, in Portuguese East Africa. It is proposed to extend this railway from Blantyre through *Zomba*, the capital, to *Fort Johnston*, on Lake Nyasa.

Agriculture is carried on principally in the Shiré Highlands, and here large crops of *tobacco* and *tea* are produced. *Coffee*, the cultivation of which is declining, is still produced in considerable quantities, and *cotton* is becoming increasingly important. The cotton produced is of good quality, but the complete development of its possibilities in Nyasaland is hindered

by the difficulties of transport and by the competition of tobacco, which is a more profitable crop.

The country is suitable for stock-rearing, but, though there are considerable numbers of cattle, goats, sheep, and pigs, the industry has not yet been developed.

The trade is almost entirely with Great Britain, the direct exports to the Mother Country in 1925 being 94·9 per cent. of the total. Communication with the sea is by rail from Blantyre to Chindio and thence by steamer to *Chinde*, a small Portuguese port at the mouth of the Zambesi, where there is a "concession area" which may receive goods consigned to or from Nyasaland duty free. There is, however, a railway running from the Portuguese port of *Beira* to *Muraça*, on the south bank of the Zambesi opposite Chindio, and when the projected bridge is constructed connecting the two lines, Nyasaland will have direct railway communication with the sea coast. The chief *exports* are *tobacco*, *cotton*, and *tea*, with smaller exports of *ivory* and *rubber*, while the imports consist mainly of provisions and manufactured goods.

CHAPTER XII

BRITISH EAST AND WEST AFRICA, THE SUDAN, BRITISH SOMALILAND, AND BRITISH ISLANDS OFF THE AFRICAN COAST

BRITISH EAST AFRICA

BRITISH EAST AFRICA comprises Kenya Colony and Protectorate, the Uganda Protectorate, the Zanzibar Protectorate, and the mandated Tanganyika Territory. The total area is almost eight times that of Great Britain and the inhabitants number over ten millions, nearly half living in Tanganyika. The population consists mainly of native races, but there are about 77,000 Hindus and Arabs, chiefly settled along the coast, who form a very important section. Apart from the Europeans, numbering some 18,000, they constitute the wealthiest and most educated part of the population, and through their hands passes almost the entire trade of East Africa.

PHYSICAL FEATURES

The region includes the greater portion of the lofty Central African lake plateau, which rises in a series of terraces from the Indian Ocean to from 3,000 to 6,000 feet above sea-level. The plateau is crossed from north to south by two rift valleys forming part of the Great Rift Valley, which, commencing in Palestine, forms the depression in which lies the Red Sea and extends through Abyssinia, British East Africa, and Portuguese East Africa to the mouth of the River Zambesi. In parts the valleys are now difficult to trace, but in others they are bordered by steep escarpments and lie some 3,000 feet below the level of the plateau. Of an average width of 30 to 50 miles, they contain a number of long, deep lakes. In the eastern rift valley the chief of these is Lake Rudolf, which extends from Abyssinia into Uganda and Kenya, and in the western lie Lakes Tanganyika, Edward, and Albert. The two valleys join together to the north of Lake Nyasa, forming the depression in which that lake lies, and between them on the plateau is situated Lake Victoria (or Victoria Nyanza), an expanse of water almost as large as the

whole of Scotland. It is from this lake and Lakes Edward and Albert that the head-streams of the River Nile flow. The formation of these rift valleys by the fracture of the rocks of the earth's surface and the subsequent sinking of the strata between the fault lines, was accompanied by great volcanic activity, as is shown by the volcanic peaks of Kenya, Kilimanjaro, Ruwenzori, Elgon, and the still active Mufumbiro, which tower above the level of the plateau.

Apart from the Nile, which is navigable from the Ripon Falls, below Victoria Nyanza, to the Sudan frontier, the rivers of the region are of little commercial importance.

CLIMATE AND VEGETATION

British East Africa lies between latitudes 5° N. and 12° S. and is entirely equatorial, but the usual equatorial type of climate is so greatly modified by the elevation of the country that large areas on the plateau enjoy a pleasant, healthy climate, and are quite fit for colonisation by Europeans. "The highest mountains are even snow-capped throughout the year, and Kenya, situated right on the equator, has several small glaciers. So anomalous did this seem when the country was first explored that geographers at home refused to believe the early travellers who reported perennial snow in the torrid zone, and they tried to explain away the white cap the pioneers claimed to have seen from afar.¹

During the southern summer the wind is from the north-east, but when the sun has "moved to the north" the summer monsoon of North Africa and Asia dominates the region and the winds blow from the south-east. At the transition periods, when the sun is overhead, weak, variable winds are experienced and, though in much of the region there is a considerable rainfall throughout the year (Fig. 35), the seasons of heaviest rain are during these transition periods, *i.e.*, during our spring and autumn. The rainfall is, however, very variable, both as regards season and amount; one year may be very wet and another comparatively dry. The temperature varies considerably with altitude, but everywhere it is characteristically uniform throughout the year, and the annual range is small. Thus at Fort Smith in the Kikuyu Hills (Kenya), 6,700 feet above sea-level, the mean annual temperature is 61° F., the difference between the mean temperatures of the warmest and coolest months being only 8° . At Mombasa, on the coast, the mean annual temperature is 78° F. and the range 6° .

The coastal plain and river valleys experience the usual equatorial climate, hot, wet, and unhealthy, and, in parts, are densely clothed with tropical forest, while along the shores and

¹ *The Climates of the Continents*, by Kendrew.

river estuaries mangrove swamps are found. To the west of this, in Kenya, the lower part of the plateau, below 1,000 feet, forms a semi-desert belt, extensive in the north but narrowing to the south, where vegetation is sparse and of the poor scrub-land type. Farther inland, however, conditions rapidly improve. The temperature falls and the rainfall becomes more abundant, the land above 4,500 feet being suitable for occupation by the white man. Here the vegetation consists of grass-land with scattered trees (savannah), and there are vast stretches of natural pasture. The vegetation of the mountains clearly shows the

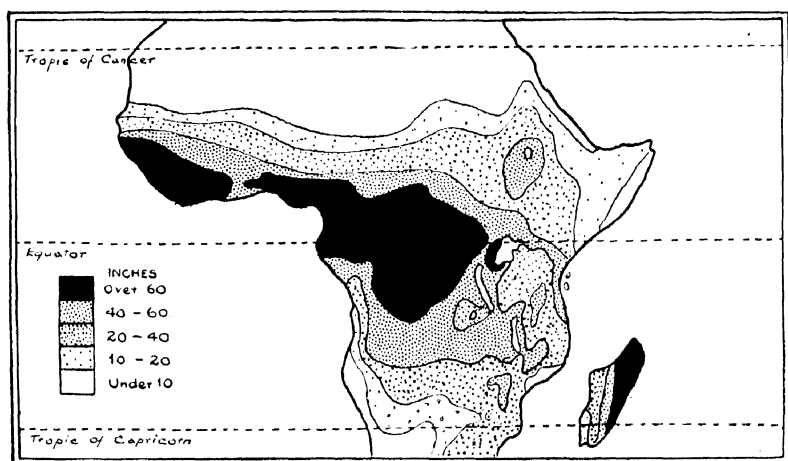


FIG. 35.—THE MEAN ANNUAL RAINFALL OF TROPICAL AFRICA.

effect of altitude ; on Mount Kenya the lower slopes are grass-land, higher up is a belt of forest, and between the limit of the forest (about 12,000 feet) and the cap of perpetual snow (above 16,000 feet) is an alpine zone with pasture and drought-resisting bushes, succeeded by a zone of mosses and lichens.

The plateau in Tanganyika is not so well watered as it is in Kenya, owing to the fact the the eastern heights rise steeply from the coastal plain above the level of the plateau, and, themselves receiving a heavy rainfall, cause the rainfall in the interior to be comparatively small. Hence, over considerable areas the vegetation is poor steppe. In Uganda the vegetation in the north is mainly steppe and thorn scrub, but towards the south are rich, rolling savannahs with patches of tropical forest. In general, however, Uganda is not suitable for European colonisation, much of the region, particularly the swampy lower lands round Victoria Nyanza, the western rift valley, and the Nile valley being malarial. Indeed, throughout the lower areas of the whole region tropical fevers are prevalent, and, particularly in Uganda, sleeping sickness has taken a very heavy toll.

COUNTRIES, PRODUCTS AND TRADE

Kenya Colony and Protectorate.

Kenya Colony and Protectorate is bounded on the east by the Indian Ocean, from the Uмба River in the south to Dick's Head in the north, and Italian Somaliland; on the north by Abyssinia; on the west by Uganda; and on the south by Tanganyika Territory. The Protectorate consists of the mainland dominions of the Sultan of Zanzibar, a coastal strip 10 miles wide extending as far north as the Tana River. In area the whole territory is more than four times as large as England, and has a population of about $2\frac{1}{2}$ millions.

As is to be expected from the physical conditions, the low-lying coastal areas produce tropical and sub-tropical products, such as *rice*, *cotton*, *coco-nuts*, *ground-nuts* and *sugar-cane*, and the forests contain *rubber trees* and such tropical timbers as *ebony*. In the Highlands of the Colony considerable areas are under *wheat*, *barley*, *maize*, *coffee*, *flax* and *sisal-hemp*, while *stock-farming* is of increasing importance. In addition to the tropical forests found along the coast and in the river valleys, in the more elevated regions there are extensive temperate forests which are, however, not yet developed. The mineral resources appear to be of considerable value but have not yet been fully explored, the only mineral of export value at present being *carbonate of soda*.

Uganda Protectorate.

The Uganda Protectorate, lying to the west of Kenya, is bounded on the north by the Anglo-Egyptian Sudan, on the west by the Belgian Congo, and on the south by Tanganyika. In area it is about as large as the British Isles. By far the most important product of the country is *cotton*, grown almost entirely by the natives, but *coffee*, *rubber*, *cocoa*, *sugar-cane*, and *oil seeds* also are important. The lower regions are forested, and *bananas* and *oil palms* are plentiful. Along the Lake shores, bananas form the staple food of the natives.

For customs purposes Kenya and Uganda are one administrative unit, so that, as practically the entire trade of Uganda passes through Kenya, the imports and exports of the two countries must of necessity be regarded together. In 1925 the principal *exports* were *cotton*, comprising about half the total value of exports, and exported mainly from Uganda, *coffee*, *fibres*, *maize*, *hides* and *skins*, *carbonate of soda*, *oil seeds*, *rubber*, *ivory*, *wool*, *copra*, *wood* and *timber*, *bark* (for tanning), and *ground-nuts*. These were consigned chiefly to Great Britain (46 per cent.), and the rest of the Empire (23 per cent.), but Belgium, Germany, Japan, Italy, Holland, United States, and France take con-

siderable quantities. The *imports*, mainly from Great Britain (33 per cent.) and the rest of the Empire (26 per cent.), consist of provisions and manufactured goods of all kinds. Other countries supplying considerable quantities of goods are, in order, the United States, Holland, Germany, Japan, Belgium, France, and Italy.

Tanganyika Territory.

Tanganyika Territory, formerly German East Africa, is held by Great Britain under a mandate from the League of Nations. It is bounded on the east by the Indian Ocean, on the north by Kenya and Uganda, on the west by the Belgian Congo, and on the south by Northern Rhodesia, Nyasaland, and Portuguese East Africa. In area it is about three times as large as the British Isles. Near the coast are tropical forests containing *ebony*, *bamboo*, and *baobab*, and yielding *beeswax*, *wild rubber*, and *gum copal*. Here, too, there are plantations of *coco-nuts*, *vanilla*, *sisal fibre*, *rubber*, *rice*, and *sugar-cane*, and, on the higher ground, of *coffee* and *cinchona*. Maize and tobacco are grown on the plateau, and increasing attention is being paid by the natives to the cultivation of *cotton*. *Stock-raising* is an important native industry, and large numbers of cattle, sheep, and goats are kept.

Though many minerals have been found in the country, and gold, mica, and garnets are worked on a small scale, the mineral wealth does not seem to be of much importance.

The chief *exports* are *sisal*, *cotton*, *coffee*, *hides* and *skins*, *ground-nuts*, *copra*, and *beeswax*. The *imports* include cotton piece goods, supplied chiefly by Great Britain, various food-stuffs, chiefly from India, and miscellaneous manufactures.

Zanzibar Protectorate.

The Zanzibar Protectorate consists of the islands of Zanzibar and Pemba, lying off the northern part of the Tanganyika coast, together with the adjacent small islands. The island of Zanzibar, which is more than four times as large as the Isle of Wight, is separated from the mainland by a channel $22\frac{1}{2}$ miles wide at its narrowest part. The smaller island of Pemba lies some 25 miles to the north-east.

By far the most important product of the Protectorate is *cloves*, Zanzibar and Pemba together yielding the bulk of the world's supply. It is estimated that the area under cloves is about 48,000 acres, and that there are over three million trees in bearing. The largest plantations are owned by the Arabs, but many small holdings are owned by natives. The only other product of importance is *coco-nuts*, copra ranking as the largest export after cloves. The trade of Zanzibar, however, is of much greater dimensions than the local productions suggest, for the

island is an important entrepôt, importing goods for transshipment to the mainland and receiving much of the produce of Tanganyika Territory for shipment to its final destination.

The history of South Africa has shown how much contiguous territories suffer, both individually and collectively, from delay in such matters as the establishment of means of co-ordinating policy and development, and it is now widely recognised that close co-operation between all the British territories in East and Central Africa is indispensable for their full development. Consequently, in July 1927, a White Paper¹ was issued by the Government, dealing with future British policy in this part of the Empire. Expressing the view that it may be found necessary to proceed by stages, the White Paper states: "While the ultimate possibility of federation of all the six territories concerned should be borne in mind, closer union may prove on examination to be practicable, in the first instance, only between Kenya, Uganda, and Tanganyika, leaving it open to Zanzibar, Nyasaland, and Northern Rhodesia to come into any new structure as and when the development of communications permits." There is no doubt that all the territories stand to gain much by the establishment of a central direction for railway policy, for their greatest problem is one of transport, and also by the setting up of a complete Customs union.

COMMUNICATIONS AND TOWNS

With the exception of the River Tana, navigable by small vessels for some 400 miles, and the Nile, navigable below the Ripon Falls to the Sudan frontier, the rivers of British East Africa are useless for navigation. The lakes, however, provide a valuable means of communication, and there are steamer services on Lakes Nyasa, Tanganyika, Victoria, Kioga, and Albert, the steamers plying on Lake Albert descending the Nile to *Nimule* on the Sudan frontier, below which point navigation is interrupted by cataracts. Apart from the lakes, therefore, there is a decided deficiency in natural means of communication, and until comparatively recent years human portage was the only means of transport throughout almost the whole region. Thus, before the building of the railway from Kisumu to Mombasa, the exports were confined to such things as ivory and rubber, which could stand the high cost of transport by natives. The effect of the railway has been very marked in stimulating the whole agricultural and commercial life of the regions adjoining it. Human portage, however, is still extensively used, though it is being rapidly superseded by motor and rail. In Uganda, for example, the mail services are carried by motors and native runners radiating from *Entebbe*, *Kampala*, and *Jinja*.

¹ Cmd. 2904.

Motor roads are being constructed to open up the huge areas as yet untouched by the railways, one of the most important being that from *Nairobi*, the capital of Kenya, across Uganda to *Mongalla*, in the Sudan, a town situated on the Nile about 40 miles below *Rejaf*, the terminus of the river steamers from Khartum. This provides through communication by rail, road, and steamer from Mombasa to Alexandria, though, at present, the only through traffic is in passengers. Another important road is that passing round the Nile rapids from *Rejaf* to *Nimule*. In Uganda there is already a network of motor roads with a fleet of government motor-vans serving the main routes, and both Kenya and Tanganyika are fairly well provided. Unfortunately, however, the roads are rendered impassable during the rains.

By far the most important means of transport are the railways, of which there are two main lines, one in Kenya and the other in Tanganyika. Of these the *Kenya and Uganda Railway*, running from *Mombasa*, through *Nairobi* to *Kisumu* (Port Florence) on Lake Victoria, is the more important. The Central Railway of Tanganyika, from *Dar-es-Salaam* to *Kigoma*, near *Ujiji* on Lake Tanganyika, is chiefly of military importance, since, except for the first hundred miles or so, the route lies through undeveloped regions. Besides these two main lines there is a much shorter line running from the Tanganyika port of *Tanga* inland to *Moshi*, in the Kilimanjaro region, serving the plantations of this district, and connected by a branch from *Voi* with the Kenya and Uganda Railway. In Uganda the Busoga Railway runs from *Jinja*, on Lake Victoria, to *Namasagali*, which is the highest point on the Nile reached by the Lake Kioga steamers, and this provides the main outlet for the Uganda cotton, the crop being sent by rail and steamer to *Kisumu* and thence by rail to *Kilindini*. Much uneconomic transshipment will be avoided when the line from *Mbulamuti*, on the Jinja-Namasagali Railway, to the Kenya and Uganda Railway at *Nakuru* is completed.

Mombasa, situated on the eastern side of a small island of that name close to the Kenya coast, is the largest town of British East Africa, having a population of over 40,000. It is the terminus of the Kenya and Uganda Railway, and until recently was the most important port of the region, dealing not only with the trade of Kenya and Uganda but with a large entrepôt trade. Unfortunately, however, goods have to be lightered owing to the shallowness of the harbour.

Kilindini, situated on the south-western side of Mombasa Island, has the finest land-locked and sheltered harbour on the east coast of Africa and, being accessible to vessels of deep draught, has replaced Mombasa as the chief port of British East Africa.

Nairobi, the capital of Kenya and the headquarters of the

administration, lies on the plateau nearly 5,500 feet above sea-level. It is situated over 300 miles from the coast, on the Kenya and Uganda Railway and, as the climate of this region is healthy for Europeans, it is becoming an important settlement. At present there are over 3,500 white people living in the town, out of a total population of nearly 26,000.

Dar-es-Salaam, situated opposite a break in the coral barrier reef which skirts the coast, is the capital and most important port of Tanganyika Territory, and the terminus of the Central Railway.

Entebbe, situated on the north-western shore of Lake Victoria, is the administrative capital of Uganda. It is served by steamer from Kisumu. The native capital of the country is *Kampala* (Mengo), situated farther north on the lake than is Entebbe.

Zanzibar is situated on the west coast of the island of Zanzibar, facing the mainland. The port, with its excellent harbour, once dominated the trade of the whole region and, though it has now given place to the mainland ports, is still an important entrepôt.

THE SUDAN

The Sudan, more correctly spoken of as the Anglo-Egyptian Sudan, since the Sudan stretches across the breadth of Africa, extends southwards from the Egyptian frontier to Uganda and the Belgian Congo, and westwards from the Red Sea, Eritrea and Abyssinia to the eastern frontiers of French West Africa and French Equatorial Africa. In area it is more than eight times as large as the British Isles, and it has a native population of about 6,500,000. The Sudan is divided into fifteen provinces, each under the administration of a British governor, and the head of administration of the whole country is the Governor-General, who is appointed by the Khedive on the advice of the British Government.

PHYSICAL FEATURES

The chief feature of the Anglo-Egyptian Sudan is the River Nile—the country is, in fact, part of the upper Nile basin, though it lies partly in the interior drainage basin of the Sahara. After leaving Uganda at Nimule, the Nile, here known as the *Bahr el Jebel*, flows through a great swamp in which its channel is very ill-defined and liable to frequent alteration. This is the region of “sudd,” the name given to the masses of vegetation which, torn from its banks and swept along with the current, floats on the surface of the river and, coming in contact with some obstruction, forms a solid mass which not only acts as a serious impediment to navigation, but causes the river to flood the

adjacent country, thus wasting much of the perennial water supply of the Sudan.

At Lake No the Bahr el Jebel receives the *Bahr el Ghazal*, which flows from the west through similar country, and from here to its outlet on the Mediterranean the river receives no other left bank tributary, the country to the west being desert. Below Lake No the river is known as the *White Nile*, and flows almost due east until it receives the *Sobat* from the Abyssinian Highlands, when it again turns north. From here to *Khartum*, a distance of about 500 miles, it provides uninterrupted navigation, except during the dry season when, at one point, passage is impossible owing to the shallowness of the water.

At Khartum, where the country is gradually passing into poor scrub, the *Blue Nile*, the second of the tributaries rising in the Abyssinian Highlands, joins the main stream, and between this point and the Egyptian frontier, a distance of some 950 miles, the river contains many reefs and shallows, in addition to five of the six cataracts of the Nile. Throughout this section, therefore, communication is chiefly by rail. Below Khartum the river begins to make its immense "S" bend, and after receiving the *Atbara*, the last of the rivers flowing from the Abyssinian Highlands, flows between the Libyan and Nubian Deserts until it enters Egypt beyond *Wadi Halfa*.

The river system thus briefly described may be divided into rivers providing a perennial supply of water, and those supplying only flood water, a distinction of great importance, as will be seen later. The perennial supply is provided by the Bahr el Jebel and the Bahr el Ghazal, while the rivers flowing from the Abyssinian Highlands, the Sobat, Blue Nile, and Atbara, provide the flood supply. These receive their water from the monsoon rains which fall on the Highlands in spring and early summer, the Sobat flooding about the middle of April, the Blue Nile about a month later, and the Atbara later still. The combined flood waters reach their highest level at Wadi Halfa about the end of June.

CLIMATE AND VEGETATION

As the country is mainly low-lying and stretches between latitudes 5° N. and 22° N., thus lying entirely within the tropics, the temperature is constantly high, varying at Khartum between 92° F. and 70° F. The great north-south extension of the country, however, causes considerable climatic variations, the annual and diurnal range of temperature increasing towards the north and the rainfall increasing towards the south. Three distinct climatic regions may be distinguished, each with its characteristic vegetation :—

(a) *The Northern, or Desert, Region*, extending from the Egyptian frontier to the latitude of Khartum. This is really

part of the Sahara for, except along the coast, it is practically rainless, and almost devoid of life, either animal or vegetable.

(b) *The Central, or Grass-land, Region*, lying between the latitudes of Khartum and Lake No. Here the rainfall of from 10 to 20 inches is insufficient for the growth of trees, which are found only along the banks of the rivers and streams. The rain falls during the three summer months, when the monsoon winds reach the region from the Indian Ocean.

(c) *The Southern Region of Tropical Swamp, Jungle, and Savannah*, extending south of the latitude of Lake No. Here the rains are heavier and the rainy season lasts longer than it does in the central region. Southwards from Lake No the rainfall gradually increases, until near the frontier of Uganda rain falls throughout the year, with maxima in May and October. Even here, however, the total precipitation is only from 30 to 40 inches. The low-lying country through which the Bahr el Jebel and the Bahr el Ghazal flow is a region of tropical swamp and jungle, but this gradually passes, on the north, east, and west, into savannah.

Except in the extreme south, therefore, the winter is dry, the prevailing wind at this season being the north-east trade.

PRODUCTIONS AND COMMERCE

The Anglo-Egyptian Sudan is essentially pastoral in character, for the great savannahs and the open woodlands of the south are suitable for *cattle*, while *sheep* and *goats* thrive on the scrub-lands and poorer grass-lands. *Camels* are reared by the desert tribes. In 1925 there were some 1½ million cattle, 5½ million sheep and goats, and half a million camels. The pastoral industry is not merely of local importance, for Egypt has now for some years depended to a certain extent on the Sudan for her meat supply, and there is, in addition, a valuable export of *hides* and *skins*. The cattle and sheep trade of the country is capable of much development, but three obstacles must first be overcome: the cattle diseases, which are endemic in the hot, rainy, southern regions, must be controlled; irrigation by wells must be provided in the regions of uncertain rainfall; and the means of communication must be improved. The elephants which roam the savannahs are a valuable source of *ivory*, and large quantities are exported every year. The forests lining the banks of the Blue Nile are rich in fibres and tanning materials, and those of the White Nile contain valuable trees, such as the ebony, gum acacia, bamboo, and rubber, while the sudd region contains almost inexhaustible supplies of papyrus. By far the most important wild product of the country, however, is *gum arabic*, the Sudan, particularly the province of Kordofan, being the chief source of the world's supply.

In the south, which has the advantage of an adequate rainfall, agriculture is carried on without irrigation, but in the centre and north of the country the people are dependent chiefly on the natural floods of the rivers. The great agricultural resources of the Sudan, however, are now being developed by means of the construction of irrigation works, and in this way a large area of land has been brought under cultivation in the Gezira plain, which lies between the Blue Nile and the White Nile south of Khartum.

On the Blue Nile at Makwar, near Sennar, an enormous dam has been erected to control the flood waters and to provide an assured water supply throughout the year. This great Gezira irrigation scheme, which makes provision for future extensions covering an area of a million acres, and comprises, besides the dam, a main canal 62 miles long, 535 miles of minor canals, 3,125 miles of subsidiary canals, and 5,625 miles of field canals, was completed in 1926. This has enabled the cultivation of *cotton*, the crop of greatest economic importance, to be greatly extended, and Britain is looking to the Sudan, more than to any other part of the Empire, to supply the bulk of the cotton required by the Lancashire mills and relieve her of her present dependence on the United States of America. In 1926 over 80,000 acres of the Gezira Plain were cultivated with fine long staple Egyptian cotton, the yield being over 17,000 tons of lint and 34,000 tons of seed. In addition, considerable and increasing quantities of long staple American cotton are being produced under irrigation in the northern provinces of Berber and Dongola, and, as a rain crop, in the provinces of Kassala (which has been successfully opened up by the construction of the Kassala railway, running from the Port Sudan-Atbara line), Fung, Blue Nile, White Nile, Kordofan, Upper Nile, Mongalla, and Bahr el Ghazal. As there are vast areas of suitable soil, the development of irrigation should make the plains of the Anglo-Egyptian Sudan one of the most important cotton-producing regions in the world.

The most important crop of the country, from the point of view of food supply, is *durrha* (millet), and large quantities are produced each year for home consumption, it being the staple food of the people. A considerable quantity also is exported for use as cattle and poultry food. Other crops of secondary importance are *sesame*, *ground-nuts*, *senna leaves* and *Pods*, and *dates*.

The only minerals at present being exploited are *gold* and *salt*, but iron ore and copper exist in considerable quantities. Gold is worked at Gabait, in the Red Sea province, and there are natural salt fields near Port Sudan, on the Red Sea coast, which supply the whole needs of the country and provide a considerable export to Abyssinia.

The bulk of the exports, consisting of gum arabic, cotton,

ivory, hides and skins are taken by Great Britain, but there is a considerable export to Egypt, the United States, Italy, France, and Germany. According to the published figures, Egypt is first as regards imports, but much of the trade credited to Egypt is really transit trade, and Great Britain again leads. The largest import consists of cotton fabrics, chiefly from Britain but also from India. Tea is sent mainly from India, sugar from Egypt, while the large quantities of miscellaneous manufactures, including flour and provisions, hardware, tools and implements, and machinery, are supplied chiefly by Great Britain.

COMMUNICATIONS AND TOWNS

Internal communications are mainly dependent on river and rail, for metalled roads are practically non-existent. All navigable reaches of the Nile and its tributaries between *Rejaf* and *Aswan* (in Egypt) are served by a fleet of government steamers, and there are now over 1,700 miles of narrow gauge State-owned railways open to traffic. The main line runs from *Wadi Halfa*, on the Egyptian frontier, via *Abu Hamed* (whence there is a branch to *Kareima*, in Dongola province), *Berber*, *Atbara* (whence an important branch proceeds to the Red Sea coast at *Port Sudan* and *Suakin*) and *Khartum* to *Sennar*. From *Sennar* a line strikes westwards across the White Nile to *El Obeid*, in Kordofan. The important line from the Atbara-Port Sudan railway to *Kassala* has already been noted. The opening of this line, which is 216 miles in length, marks an important step in the development of the Sudan, as it links *Kassala* with the Red Sea and *Khartum*, but though it traverses land for the most part unproductive, its ultimate object is to serve the lands which, with vast irrigation schemes emanating from the River Gash, are being devoted to the cultivation of cotton.

It is noteworthy that the main line forms part of the northern portion of the projected Cape to Cairo Railway. In addition to the steamer and rail services, connection with Uganda and Kenya is now maintained by motor road from *Mongalla* to *Nairobi*.

Khartum, the administrative capital and most important centre of the Anglo-Egyptian Sudan, is a town of about 31,000 inhabitants. It stands on a low tongue of land between the White Nile and the Blue Nile at their confluence, and is therefore favourably situated at the convergence of river routes, along both of which it has water communication. It is also the starting-point and terminus of caravan routes to the interior, and has railway communications north and south. Apart from its economic and political importance, however, it is of great historic interest as the scene of General Gordon's heroic stand against the forces of the Mahdi in 1884-85, and of his tragic death two

days before the relieving forces reached the town. It now contains Gordon College, an important educational institution, to which are affiliated the Wellcome Tropical Research Laboratories, where investigations are conducted in connection with tropical diseases and the economic products of the country. Already the outlet for a vast area by steamer, train and caravan, the town will be of increasing importance with the development of the rich Sudanese lands. An important centre south of Khartum is *Kodok*, or Fashoda, situated north of the confluence of the Sobat.

Omdurman, the old Dervish capital and a commercial town of over 78,000 inhabitants, is situated close to Khartum on the west of the river. It is the largest town of the Anglo-Egyptian Sudan.

Port Sudan, situated 36 miles north of Suakin on the Red Sea, is the terminus of the railway line from Atbara and, although of recent development, it is the chief port of the country and the main outlet for its exports.

BRITISH SOMALILAND

The protectorate of British Somaliland lies between French Somaliland on the west, Italian Somaliland on the east, Abyssinia on the south, and the Gulf of Aden on the north. In area it is somewhat larger than England and Wales, and its population of about 344,000 is composed of nomadic Somalis and Arabs. The country is low and arid near the coast, rising inland to hills and plateaux with a somewhat moister climate. The vegetation is composed of scanty pasture and shrubs, and agriculture cannot be carried on successfully on an economic scale. There are no railways or navigable rivers, and transport is by camel and motor-car. The exports of *gum arabic*, *live cattle*, *hides* and *skins* are consigned from the capital and chief port, *Berbera*, the trade being mainly with Aden and India. The country is of small economic importance, its value to the British Empire being chiefly strategic.

BRITISH WEST AFRICA

Most of West Africa belongs to France, but there are four British colonies extending like enclaves into the French possessions. These are, in order from west to east, the Gambia Colony and Protectorate, the Sierra Leone Colony and Protectorate, the Gold Coast Colony with Ashanti and the Northern Territories, and the Colony and Protectorate of Nigeria.

PHYSICAL FEATURES

Each of these territories has a narrow coastal plain continuing inland to a low plateau which rises in the interior to an average height of about 2,000 feet above sea-level. The rivers bring down

large quantities of silt, especially during the wet season, and this is drifted along the surf-beaten, unindented coast by the eastward-flowing Guinea current. Consequently the mouths of the rivers are mostly choked with sand or with mangrove swamps, and long sand dunes enclose great coastal lagoons. Also, the coastal waters are rendered shallow by the constant accumulation of sand and material brought down by the rivers. Good harbours, therefore, are few.

CLIMATE AND VEGETATION

As all the territories lie within a few degrees of the equator, the climate is one of constant heat, the mean annual temperature of the coastal lands never varying more than 5° above or below 80° F. in any month of the year. The seasons, which are very well defined, depend, therefore, on rainfall rather than on temperature. With the exception of Gambia, these territories experience a heavy rainfall in their coastal districts (Fig. 35), though the amount varies considerably with local conditions of relief and the direction of the prevailing winds. The "swing of the sun" between the two tropics causes the rainfall regime near the equator to consist of two well marked wet seasons separated by "dry" seasons of varying duration, when the rainfall is very much diminished, and farther from the equator, towards the interior, the amount of rainfall decreases, the "dry" seasons lengthening and being separated by one short wet season. Farther north still the wet season disappears altogether and desert conditions prevail. Along the coast near the equator, therefore, there is a long wet season from March to June and a short wet season from October to December. Towards the interior, in the Northern Territories of the Gold Coast and the Northern Province of Nigeria, there is one wet season extending from May to September, while farther north still, beyond 15° N., in Gambia and Nigeria, the rainfall is small and desert conditions begin to appear.

The prevailing winds on the coast are from the south-west throughout the greater part of the year, with a south-easterly and southerly variation, for the land is constantly hot, and the low atmospheric conditions which prevail cause the south-east trade winds to be drawn across the equator and deflected in much the same way as the south-west monsoon of India, though on a much smaller scale (see Fig. 5). The south-westerly winds blow throughout the whole region in summer, but in winter they reach only as far as the edge of the plateau. To the north, in the Sahara, the prevailing wind is the dry north-east trade, and between these two sets of winds there is a belt of calms and variable winds. When, for a short period during January and February, the north-east trade breaks through and reaches the

coast it is hot and dust-laden and is known as the *Harmattan*. On account of its health-restoring properties it is known locally as "The Doctor." As the winds blow from across the warm Guinea current almost continuously throughout the year, it is not surprising that the coastal lands and the slopes of the plateau receive a heavy rainfall.

The constant heat and moisture on the coast give rise to an unhealthy climate which has caused the "West Coast," in the past, to earn only too thoroughly the name of "the white man's grave." The following description¹ of coastal Nigeria is typical of the whole Guinea coast. "It is characterised by a very abundant rainfall, the rainy season extending over nearly the whole year, and by a small range of temperature. . . . Here we have the 'West Coast' climate in its most deadly form. The usual mangrove swamp fringes all the innumerable creeks and streams, the trees growing out of foetid and pestilential slime which reeks with rotting vegetation. The climate is probably the most unhealthy in the whole world, an enervating moist heat day and night throughout the year. . . . The air is almost always charged with all the moisture it can contain. This constant damp heat weakens the strongest European constitution and leaves it a prey to malaria and numerous other diseases fostered by the climate and the insanitary native villages." Vast strides have been made, however, in combating most of the diseases, notably malaria and sleeping sickness, and in improving the conditions, and the Coast is no longer the terror that it was. It used to be said that return tickets were not issued to West Africa because they were *not needed*. Inland on the plateau, where the heat is tempered by altitude and the rainfall is much lower, the climate is quite healthy.

The distribution of the rainfall is clearly reflected in the distribution of the vegetation. On the coastal plains and the slopes of the plateau there are great tropical forests containing many valuable hardwoods, such as *ebony* and *mahogany*, fruit trees such as the *banana*, *rubber trees*, *coco-nut palms* (on the coast of Togoland), the the valuable *oil palm*, the fruit of which provides the important exports of palm oil and palm kernels, to the demand for which the development of Sierra Leone, the Gold Coast, and Southern Nigeria is so largely due. Here, too, nature has been assisted by man, and there are plantations of oil palms, cocoa, and Brazilian rubber trees, the last, however, in no way to be compared with those of British Malaya. Farther towards the interior the forests thin out, and open park land, or savannah, takes their place, in its turn passing into grass-land with trees appearing only along the banks of the rivers. In the extreme north of Nigeria desert conditions begin to prevail.

¹ From Kendrew's *Climates of the Continents*.

COUNTRIES

Gambia.

The Gambia Colony and Protectorate consists of a number of small islands in the River Gambia, and a narrow strip of territory extending along both banks of the river for a distance of about 250 miles from the coast. The colony comprises the Island of St. Mary, on which the capital, *Bathurst*, stands, and is only 4 square miles in area, the remainder of the territory, about half as large as Wales, being administered as a protectorate. As a result of the comparatively low rainfall, the prevailing type of vegetation is savannah, except along the banks of the river, where, especially in its lower reaches, there are mangrove swamps. The population, numbering about 200,000, is composed mainly of Sudanese negroes, who carry on primitive forms of agriculture, cultivating maize, millet, and rice, and keeping cattle, sheep, and goats. The only crop produced for export is *ground-nuts*, and these constitute the main product of the country, and represent about 90 per cent. by value of the total export trade, the remainder being composed of *palm kernels*, *hides*, and *skins*.

Bathurst, though provided with wharves and jetties which may be reached by ocean steamers, is not a port of call for the chief steamship lines serving Africa, and, as a result, much of the trade passes through the French port of Dakar, in Senegal, and through Sierra Leone, in the Gold Coast. Consequently the bulk of the trade is with France, though the trade with Great Britain is considerable. The imports consist chiefly of clothing, provisions, and hardware, Great Britain supplying most of the cottons, and sharing with France and the United States in the supply of hardware. India sends gunny bags and rice, and there is a considerable import of kola nuts (for chewing) from Sierra Leone. Internal communications are maintained by steamers plying on the Gambia, which is navigable within the Protectorate throughout the greater part of its course.

Sierra Leone.

The Colony and Protectorate of Sierra Leone, situated between French Guinea and the native republic of Liberia, has a total area slightly larger than that of Scotland, and a population of some $1\frac{1}{2}$ millions, chiefly composed of negroes. The colony, which has an area of approximately 4,000 square miles, extends inland for a distance varying from 8 to 20 miles, and includes the Yellaboi and other islands in the north, and Sherbro and various smaller islands in the south. The protectorate extends inland for about 180 miles, and is administered by the Governor of the colony. The whole country extends through undulating land to the edge of the African plateau, and is drained by many rivers

flowing from the high land of the north-east radially towards the plain. It was to the colony of Sierra Leone, originally established as a home for emancipated slaves, that the title of "the white man's grave" was first applied, and though enormous advances have been made since the days when it all too thoroughly merited the name, the hot, damp heat will always make the country a trying one for Europeans. At Freetown, on the coast, the mean annual temperature is 81° F., with but a very slight range throughout the year, and the mean annual rainfall 174 inches.

The country, consequently, is clothed with tropical forests containing such trees as the *oil palm*, *coco-nut*, *fan-palm*, *kola*, *banana*, and *bread fruit*, and various hardwoods. Much of the forest has now been cleared, however, to make room for agriculture, and on the higher land in the interior, where both the temperature and rainfall are less than on the coastal lands, open pasture provides grazing for the large herds of cattle kept by the natives. Considerable quantities of rice, cassava, ground-nuts, and bananas are produced for local consumption, but not, at present, for export, the chief economic products being obtained from the oil palm and kola tree. The oil palm is very widely distributed throughout the country and yields *palm oil* and *palm kernels*, which in 1925 accounted for over 68 per cent. of the total exports. In the same year *kola nuts* accounted for over 11 per cent. Other exports of less importance are *ginger* and *piassava* (used for brushes). Most of the palm oil and kernels is taken by Great Britain, and the kola nuts are much in demand in Senegal, Gambia, and Nigeria, to which large quantities are sent annually. The imports consist chiefly of cotton manufactures, coal, tobacco, spirits, oil, and hardware.

Practically all the trade passes through *Freetown*, the capital and chief port. Situated on the Sierra Leone peninsula, which with the Bullom peninsula almost encloses the estuary of the Rokelle River, the town has a safe and commodious harbour hitherto unrivalled on the West Coast. Unlike Bathurst, Freetown is an important port of call for all vessels on the Guinea route, and consequently is of much more than local importance, carrying on a considerable entrepôt trade and acting as a great coaling station. From Freetown a government railway (2 feet 6 inch gauge) runs to *Pendembu*, near the Liberian frontier, a distance of 227 miles, and from *Boia Junction*, 64 miles from Freetown, a line, 104 miles in length, runs to *Kamabai*. These lines are the chief arteries of communication with the interior, and have played a very great part in the development of the country. There is also a mountain section linking Freetown with *Hill Station*, 6 miles distant, the official headquarters of the country.

Gold Coast.

The Gold Coast Colony stretches for 334 miles along the Gulf of Guinea, between the French Ivory Coast and French Togoland. It is administered by a governor, who is also responsible for the administration of Ashanti and the Northern Territories, lying in the interior, and of the mandated territory of Togoland, a former German colony which, after the war, was mandated to Britain and France. The country as a whole is about as large as England and Scotland combined, and has a native population of over 2 millions, the Europeans numbering about 2,000. The low-lying coastal strip is hot, moist, and unhealthy, but inland the altitude and distance from the sea cause a diminished temperature and rainfall which render the climate somewhat more tolerable. Thick forests, containing oil palms, rubber, gum copal, kola, and such valuable timbers as mahogany and cedar, cover much of the region, except where they have been cleared for agricultural purposes, but in the Northern Territories the vegetation is of the savannah type and the land is suitable both for pasture and agriculture.

By far the most important product of the region is *cocoa*, which, widely grown by native farmers under white supervision and instruction, accounted in 1925 for over three-quarters of the total value of the exports. Second in value is *gold*, of which over 218 thousand ounces (representing at value of £840,525) were exported in 1925. The third export in order of value also is a mineral, nearly 339 thousand tons of *manganese ore* being exported. The output of the manganese mines has increased from 33 thousand tons in 1919, and the industry is steadily increasing in importance. The remaining products of export-importance are, in order of value, *kola nuts*, lumber—principally *mahogany*, *palm oil* and *kernels*, *diamonds*, *rubber*, and *copra*. The forests contain an abundance of wild rubber, but the rubber plantations established in Ashanti and the coastal districts bid fair to prove of greater economic value. The forests also contain an abundance of oil palms and mahogany trees, and the output of palm oil and kernels and mahogany should increase as the means of transport are improved. In the Northern Territories the open savannah land favours cattle-rearing and the production of grain and ground-nuts.

The largest town of the region is *Kumasi*, in Ashanti, but *Accra*, until recently the chief port, is the capital. At the ports of *Accra* and *Sekondi*, however, goods have to be lightered, often through heavy surf, and the construction of the deep-water harbour near Sekondi at *Takoradi* is therefore of great importance. This port is destined to become the chief port not only of the Gold Coast, but of the whole of West Africa.

Transport is chiefly by rail and road. There are about 400 miles of railway open to traffic and another 100 under construc-

tion, while road construction is proceeding rapidly, there being at present over 1,200 miles of main roads and 2,800 miles of secondary roads in the territory. The chief railway line runs from *Takoradi* and *Sekondi* to *Kumasi*, a distance of 168 miles, and *Kumasi* is connected with the coast also by a line from *Accra*. North of *Kumasi* transport is carried on by motor, and the most important road is therefore that running from *Kumasi* to *Tamale*, the administrative centre of the Northern Territories. Away from the roads and railways goods are carried chiefly by native porters.

The imports consist chiefly of cotton manufactures, hardware, machinery, motor-cars, oil, coal, spirits, and provisions, and the trade is chiefly with Great Britain, followed by the United States, Germany, Holland, and France.

Nigeria.

Nigeria is both the largest and most important of the British West African territories. Consisting of the Colony and Protectorate of Nigeria, the latter comprising the Northern and Southern Provinces, it has an area about four times as large as that of Great Britain and a population of more than 18 millions, of which about 4,000 are Europeans. West and east of the country lie, respectively, the French mandated territory of Togoland and the British mandated territory of Cameroon, which is attached to Nigeria for administrative purposes. Most of this former German colony, however, is now administered by France. Northern Nigeria, which forms part of the tableland, has a general inclination to the north, the Lake Chad depression lying in the extreme north-east. Across the tableland run two main valleys, that of the River Niger from the north-west and that of the River Benue, its great tributary, from the north-east. At the edge of the plateau these rivers unite, and the great river thus formed descends to the coastal plain of Southern Nigeria which it crosses and has extended seawards, forming a large delta.

The dense forests covering the Niger delta and the coastal plain are very rich in the *oil palm*, and such valuable hardwoods as mahogany, ebony, and rosewood, and the arms of the delta have long been spoken of as the Oil Rivers. The rich park-like savannahs of the interior provide favourable conditions for agriculture and stock-raising. The natives cultivate the land, producing maize, millet, rice, sugar, and sweet potatoes as food crops, and, on the plateau, keep large herds of cattle. The different physical conditions of the north and south lead to the exchange of products between the two regions, and the volume of internal trade is very large.

The country's economic importance, however, depends upon its exports, the chief of which are palm oil and kernels, ground-

nuts, tin ore, cotton, cocoa, hides and skins. *Palm oil* and *kernels* together account for more than half the total value of the exports, in 1925 nearly 5 million pounds' worth of kernels and over 4 million pounds' worth of the oil being exported. *Ground-nuts* are cultivated throughout the territory, and with the opening up of the country by the railways, the export, already large (nearly £2,400,000 in 1925), should increase. *Cotton* has long been cultivated for native use, and its manufacture has been carried on in the large native city of *Kano* for many years. The native farmers have now been induced to cultivate cotton as a money crop, and the export is gradually increasing. In 1919 the export was valued at less than half a million pounds, in 1925 at over three-quarters of a million pounds. The chief drawbacks to the development of the industry are the somewhat primitive methods of cultivation employed and the lack of adequate means of transport in many parts of the country. *Cocoa*, produced on plantations both in the west, behind Lagos, and in the south-east, is exported in considerable quantities though, in comparison with the export of the Gold Coast, the amount is still small (35,900 tons in 1924-25). *Hides* and *skins* are exported to the value of over half a million pounds, and the conditions are favourable for the development of a meat industry. There is a small export of "morocco" leather, made at *Kano*, which town used to be a great slave market and is now an important market for ground-nuts and a busy centre for trade with the interior. Other exports of vegetable or animal origin are *mahogany*, which is cut only where it is found near creeks or rivers, *shea-butter*, *rubber*, and *ivory*.

The mineral wealth of Nigeria is considerable, and the natives have worked iron, lead, and tin for centuries. Of these *tin* is being mined in increasing quantities on the Bauchi plateau, and forms the fourth most important export, nearly 1½ million pounds' worth being shipped in 1925. It might be exported in considerably larger quantities were it not for the reliance placed on native labour and the relatively small scale working. *Coal* is found along both banks of the Niger on the coastal plain, and is mined for use on the railways at *Udi*, in Southern Nigeria, 150 miles by rail from *Port Harcourt*.

As the country consists of the lower portions of the basins of the Niger and the Benue it is natural that these rivers should be much used as a means of transport. The Niger is navigable, by way of the Forcados arm of its delta, as far as *Jebba*, in Northern Nigeria, the draught of vessels being limited in the dry season to 3 feet and in the wet to 5, but, except at high water, navigation is precarious even for shallow-draught vessels, and steamers often run aground on account of the frequent alteration of the channels. The Benue is practically unnavigable during the dry season, but in the wet season vessels drawing up to 10 feet of water can ascend as far as *Yola*. At one time the

rivers were the one great means of transport, but railway development, and, with it, commercial development, has proceeded rapidly, and the system is still being extended. Moreover, there are now many miles of well-made motor roads. The railway system comprises two great lines, the western and the eastern, which formerly were disconnected. The western railway runs from *Lagos*, the capital and chief port, to *Kano*, a distance of 685 miles, crossing the Niger by a bridge at *Jebba* and passing through *Zungeru*, *Minna*, *Kaduna*, and *Zaria*, the centre of the cotton-growing district. From *Zaria* an important branch serves the Bauchi tin-fields, and from *Minna* there is a branch to *Baro*, on the Niger. The eastern line, 560 miles in length, runs from *Port Harcourt* to *Kaduna*, crossing the Benue by train ferry at *Makurdi*. It is connected with the western railway also by a line from Kaffanchan Junction which joins up with the branch serving the tin-fields.

Lagos, on a small island within a large lagoon, used to be a lighter port, but a deep channel has been cut through the bar and moles have been constructed, thus permitting ocean-going vessels to berth alongside the wharves. Most of the ocean trade is carried on through this port, since elsewhere lighters and surf-boats still have to be used. The imports, which consist chiefly of cotton goods, hardware, and miscellaneous articles, are supplied mainly by Great Britain, which also takes the bulk of the exports.

Striking witness is borne by Sir Frederick Lugard, late High Commissioner of Nigeria, to the beneficial results of British rule not only in Nigeria, but throughout tropical Africa. He says, "in Nigeria in 1902, slave-raiding armies of 10,000 or 15,000 men laid waste the country and wiped out its population annually in the quest for slaves. Hundreds of square miles of rich well-watered land were depopulated. . . . (Fifty years ago) . . . men were impaled in the market-place of Kano. The prisons were places of horror. Nowhere was there security for life and property. To-day the native Emirs vie with each other in the progress of their schools; the native courts administer justice, and themselves have liberated over 50,000 slaves. The Sultan of Sokoto and the other Emirs are keenly interested in such questions as afforestation, artesian well-boring, and vaccination. . . . Similar results may be seen in every other British dependency in tropical Africa."¹

BRITISH AFRICAN ISLANDS

Most of the British islands lying off the African coasts, apart from those which have already been dealt with in connection with the mainland territories, are of comparatively small economic importance.

¹ *The Dual Mandate in British Tropical Africa.*

Ascension.

Ascension is a small island 34 square miles in area lying in the South Atlantic, 700 miles north-west of St. Helena, of which colony it forms a part. The climate is a healthy one, and the island is used as a sanatorium for British sailors serving on the West African station. It is noted for sea turtles, which come in thousands to lay their eggs each year between January and May. Vegetables and fruits are grown to supply the needs of the small population, and phosphates and guano are collected. The island is chiefly important as a cable and coaling station.

St. Helena.

St. Helena is a British colony administered by a governor. The island, which lies in latitude 16° S., 1,200 miles west of the coast of South Africa, is somewhat larger than Ascension and has a population of nearly 3,750. The climate is healthy and the soil fertile. Fruit and vegetables are grown and cattle reared for local use, and phormium (New Zealand flax) is cultivated for export. St. Helena is an Admiralty coaling station and has cable connection with Cape Town and St. Vincent. The chief port of the island is *Jamestown*. Both Ascension and St. Helena lost much of their importance with the opening of the Suez Canal and the passing of the sailing vessel.

Tristan da Cunha.

Tristan da Cunha is the largest of a small group of islands lying in the Atlantic midway between the Cape of Good Hope and South America. The island is inhospitable, and the few inhabitants, who lead an extremely lonely life, have a hard struggle for existence. There is no form of government, and ships visit the island at irregular and very infrequent intervals.

Mauritius.

Mauritius, a volcanic island nearly five times as large as the Isle of Wight, lies in the Indian Ocean, 500 miles to the east of Madagascar. The island is a British colony and has a population of nearly 400,000, composed mainly of Indians, with about 120,000 people of European (chiefly French) descent and 7,000 Chinese. The climate is always hot, though rarely excessively so, with an adequate rainfall, brought by the S.E. trade winds, evenly distributed throughout the year. Occasionally the island suffers from violent hurricanes. The natural vegetation is tropical forest, but much of the timber has been felled. Agriculture is the chief industry, and the staple product, *sugar-cane*, accounts for over 90 per cent. of the exports, the average production of sugar being about a quarter of a million tons per annum. The only other exports of importance are *sisal fibre*,

copra, and *coco-nut oil*, while for the necessities of life the colony has to rely on imports from abroad. The trade, import and export, is chiefly with India, Burma, and Great Britain. *Port Louis*, the capital and chief port, is situated on the north-west coast, and is a cable and coaling station.

RODRIGUEZ and the CHAGOS ARCHIPELAGO are dependencies of Mauritius. Rodriguez lies about 320 miles farther east, and the Chagos Archipelago, the chief island of which is *Diégo Garcia*, lies about half-way between Mauritius and India. Neither is of much commercial importance.

The Seychelles.

The Seychelles Archipelago is a British colony which, with its dependencies, consists of 92 islands having a total area of about 150 square miles.

MAHÉ, an island about as large as Jersey, is the chief of the group, and on it is situated *Victoria*, the capital of the colony. The islands lie between the Chagos Archipelago and the east coast of Africa, about 1,000 miles east of Mombasa. Situated within a few degrees of the equator they experience a uniformly warm, wet climate, and are consequently clothed with tropical vegetation, coco-nut palms and cinnamon trees being specially abundant. *Copra* and *coco-nut oil* are the chief exports, others being *vanilla*, *cinnamon oil*, *oil of cloves*, and *guano*. Rubber and pine-apple plantations, however, have been established, and should provide valuable exports in the future.

CHAPTER XIII

THE COMMONWEALTH OF AUSTRALIA

THE Commonwealth of Australia consists of the eight States of New South Wales, Victoria, Queensland, South Australia, Western Australia, North Australia, Central Australia, and Tasmania, and the Federal Territory, in which is situated *Canberra*, the capital of the Commonwealth. The total area is nearly three million square miles—larger than that of the United States of America—the great island-continent of Australia measuring 2,400 miles from east to west and 2,000 from north to south. It is situated many thousands of miles away from the other great continents, in the wide expanses of the water hemisphere, and faces northwards towards the East Indies and New Guinea, eastwards towards South America across the breadth of the South Pacific, westwards towards Africa across the Indian Ocean, and to the south, beyond the Southern Ocean, lies the frozen continent of Antarctica.

PHYSICAL FEATURES

The continent is fairly compact in shape, and the lack of indentations in the coast causes it to have a relatively short coastline. The highest land is situated near the coasts, the interior consisting mainly of a great plateau. Unlike South Africa, which it resembles in many ways, it has its greatest extent from west to east, and this accounts for important differences in the physical and economic conditions of the two countries. The chief features of the coastline, which in spite of the enormous area of the continent, is only about three-quarters as long as that of Norway, are, in the north, *Arnhem Land* and *Cape York Peninsula*, which enclose the great *Gulf of Carpentaria*, and, in the south, the *Great Australian Bight*, an elliptical curve of coastline 1,000 miles long, bounded by high cliffs unbroken by a single river, followed towards the east by *Eyre's Peninsula*, *Spencer Gulf*, *Yorke Peninsula*, and the *Gulf of St. Vincent*. A marked feature of the north-east coast is the *Great Barrier Reef*, a coral reef about 1,200 miles in length which encloses the coast, presenting few safe openings for ships and forming a channel varying in width from 150 miles in the south to 20 miles in the north.

According to relief the country may be divided into three fairly distinct regions, the Eastern Highlands, the East Central Plains, and the Western Plateau.

THE EASTERN HIGHLANDS.—These extend from Cape York, in the north, to South Cape, in the extreme south of Tasmania, being broken only by the shallow Bass Strait, which separates that island from the mainland. At one time they were composed of great ranges of mountains formed by the folding of the earth's crust, but during countless ages they have been exposed to the action of the weather and the peaks have been worn down to mere blunt stumps. This great levelling down process has converted the region into a kind of plateau which falls steeply to a narrow coastal plain on the east and slopes gently to the plains on the west. From the coastal plain the edge of the highlands has the appearance of a great range of mountains, and it was given the name of the Great Dividing Range by the early colonists, who found it an obstacle cutting them off from the interior. It no longer impedes communication with the west, however, for only its highest peak, Mount Kosciusko, rises above the snow-line, and it is cut by many transverse valleys which have been utilised in the construction of roads and railways. Accordingly it is not now referred to as a single range, its most prominent portions having been given separate names. Thus, southwards from Brisbane it is known successively as the *New England Range*, the *Liverpool Range*, the *Blue Mountains*, which rise in steep escarpments behind Sydney and are famous for their magnificent scenery, and the *Australian Alps*, which contain Mount Kosciusko (about 7,300 feet).

It is in the Eastern Highlands that most of the Australian rivers rise, for they lie across the path of the south-east trade winds. The rivers flowing to the east and south across the coastal plain are necessarily both short and rapid. Such are the *Hunter*, behind Newcastle; the *Brisbane*, at the mouth of which lies the city of that name; the *Fitzroy*, behind Rockhampton; and the *Burdekin*, near whose mouth lies Townsville. These rivers are of little use for navigation, being much impeded by rapids and falls in their upper reaches and by sand bars where they slow down in crossing the coastal plain. Their valleys, however, provide natural routes to the interior and are, consequently, utilised by the railways.

The gentle slope of the land towards the interior renders the westward- and northward-flowing rivers long and sluggish, several, notably the *Murray* and the *Darling*, exceeding a thousand miles in length. But they, too, are of little use for navigation, for the climate is so hot that they lose much water by evaporation, and in the dry season often entirely lose their character as rivers, becoming mere strings of waterholes. Many, in fact, dry up completely long before they can reach either the sea or Lake Eyre.

THE EAST CENTRAL PLAINS.—Extending westwards from the Eastern Highlands is a great lowland area stretching across the

continent from the shallow Gulf of Carpentaria in the north to Encounter Bay in the south. This reaches its lowest level in the north-east of South Australia, where *Lake Eyre*, a shallow salt lake, lies below sea-level and is consequently the centre of an island drainage system. In the dry season this lake is reduced to a salt plain, and the rivers flowing into it to lines of waterholes. In the north of the plains there is a broad belt of higher land forming a kind of low bridge between the Eastern Highlands and the Western Plateau, and from this the *Flinders* and several other rivers flow to the Gulf of Carpentaria. The south-eastern part of the plains consists of the basin of the *Murray* and its tributaries, the *Darling* and *Murrumbidgee*, and this is separated by the *Mount Lofty* and *Flinders Ranges*, which extend northwards from Encounter Bay, from the low-lying land between Spencer Gulf and Lake Eyre, containing Lake Torrens and several smaller lakes. Except for the northern belt of higher land, the plains are everywhere below 600 feet in height. Practically the whole region is underlain by vast stores of water, the largest of the artesian basins of Australia extending from the Gulf of Carpentaria through eastern Queensland into South Australia and New South Wales (Fig. 36). Further, in the area between the rivers Darling and Murray in the south-east the rivers are very useful for irrigation purposes. In spite of the low rainfall, therefore, the region is capable of great development.

THE WESTERN PLATEAU.—This is much the largest of the three physical divisions of Australia, covering 54 per cent. of the continent and, except for the coastal plains, including all Western Australia, most of North and Central Australia, and the western half of South Australia. It falls gently to the plains on the east, but on the west the descent to the coastal plain is abrupt and the edge of the plateau forms a steep escarpment, the *Darling Range*. On the south, it forms cliffs 200 to 300 feet in height, bordering the Great Australian Bight, unbroken for hundreds of miles eastwards of King George Sound. The plateau has an elevation, over most of its area, of between 1,000 and 1,500 feet, but in the interior, near its eastern margin, it reaches a height of over 3,000 feet in the *Musgrave* and *Macdonnell Ranges*, and from these a belt of land between 2,000 and 3,000 feet in height crosses the central region in a south-westerly direction. The whole of the interior is deficient in rainfall and this belt separates two great deserts, the *Great Victoria Desert* in the south and the *Great Sandy Desert* in the north. The higher regions of the plateau receive a small rainfall, but the streams to which they give rise usually end in salt swamps or are swallowed up by the desert. No rivers reach the south coast and few the west, the *Swan* being the only one whose flow is sufficiently constant to render it useful for navigation.

CLIMATE

Although Australia is an island, the influence of the sea is not felt far from its coastal regions, for not only is the area of the continent great and the shape compact, but the highest land borders the coasts, especially on the east, thus shutting out the rain-bearing winds from the interior. Further, much of the continent lies in one of the driest zones of the earth, the calms of the tropical high pressure belt, for it extends between latitudes 11° S. and 39° S. and is almost bisected by the Tropic of Capricorn. It is, therefore, the most arid of the continents. But the climate in the populated parts, indeed in all but the northern regions, is very healthy, the expectation of life being longer in Australia than in most parts of Europe, including Great Britain.

Temperature.

As the greatest extension is from east to west, the part of the continent lying within temperate latitudes does not reach high enough latitudes to be cold in winter and, consequently, at that season snow is almost unknown in the lowlands and falls on the highlands only in the south-east. The temperature may, however, fall below freezing-point at night everywhere south of the tropic in winter, and even in summer the desert nights are cold, since the clear, dry air assists radiation from the earth's surface by night just as readily as it allows the sun's rays to penetrate it by day. Except in Tasmania, the summer temperature everywhere is high. In January (mid-summer) only the south-west and south-east coasts experience a lower temperature than 70° F., and over the greater part of the continent the thermometer registers over 80° F. The cold currents from the Antarctic Drift which wash the southern and western shores have little or no effect on the temperature of the land, for though the interior is warmer than the coasts, the west coast is considerably warmer than the east, which, moreover, is washed by the warm waters of the south equatorial current. Exceedingly high temperatures are experienced throughout the interior in the neighbourhood of the tropic, owing to the cloudless sky and dry air, and intense heat is sometimes recorded even on the south coast. The very dryness of the air, however, is an advantage, in one respect at least, for it renders the heat more bearable by man. The range of temperature throughout the year depends on distance from the sea as much as on latitude. Thus at *Port Darwin*, on the north coast, it is only 8° , at *Adelaide*, on the south coast, it is 23° , while at *Alice Springs*, in Central Australia, almost on the tropic, it is 32° .

Rainfall.

The main meteorological feature of Australia is the tropical high-pressure belt which stretches across the continent. From

this, winds blow outwards and, being deflected to the left, blow from the south-east on the equatorward side of the belt and on the poleward side from the north-west. The former are the *South-East Trades* and the latter the *Westerlies*. During the southern winter, when the sun has, apparently, moved to the north, the centre of highest pressure is situated in the neighbourhood of the Lake Eyre depression and the prevailing winds north of the tropic are the *South-East Trades*. This is the dry

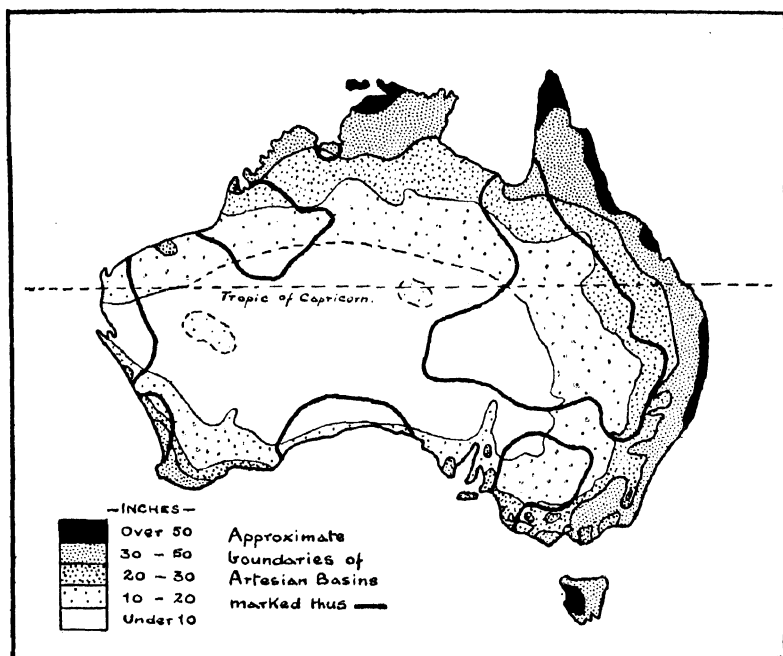


FIG. 36.—THE MEAN ANNUAL RAINFALL OF THE COMMONWEALTH OF AUSTRALIA.

season in the northern part of the continent. On the south side of the high pressure zone, the winds blow from the north-west and bring rain to the south-west corner of Western Australia and to the district on either side of Spencer Gulf and the Gulf of St. Vincent, causing these areas to have winter rains. The whole of Tasmania, too, receives rains from these westerly winds. In the southern summer, the continent is much more heated and the pressure is therefore lower everywhere. The high pressure belt is not so marked and lies over the south of the south coast. Thus, at this season, the westerly wind belt lies well to the south and, but for Victoria, the most southerly part of the continent, Australia rarely comes within its influence. Even in Victoria, the rainfall is much less than in winter. Tasmania, however,

receives rain from the westerlies throughout the year. At this period, the north of Australia is having its rainy season, for just as the northern plains of India become heated and cause low pressure conditions to develop over them in the northern summer, so in the southern summer does the north-west of Australia. Consequently, monsoon winds blow in to the north of the continent from over the warm seas between Asia and Australia, causing heavy rain. (Fig. 36.)

NATURAL REGIONS

As a result of the operation of these physical factors, Australia may be divided into seven well-marked natural regions : the tropical forest region, the tropical grass-lands and savannahs, the east coast, the temperate grass-lands, the Mediterranean region, the Tasmanian region, and the arid interior.

THE TROPICAL FOREST REGION.—In the north and north-east the temperature is always high, the annual mean being 80° F. Most of the rainfall, which in the coastal districts exceeds 60 inches per annum, falls in summer during the prevalence of the monsoon. The great heat and moisture cause the region to be clothed with tropical forests containing *palms*, *bamboos*, *bananas*, and many valuable *hard woods*, and such tropical products as *rice*, *sugar-cane*, *cocoa*, *spices*, and *rubber*, are successfully cultivated. The region, however, is too unhealthy for the white man and, in the absence of coloured labour, its development is, therefore, retarded.

THE TROPICAL GRASS-LANDS AND SAVANNAHS.—South of the tropical forest region and extending in the north-west and on the inner side of the eastern highlands to south of the tropic, are tropical grass-lands and park-like savannahs. The rainfall decreases towards the interior and they gradually pass into semi-desert everywhere except on the east, where they merge into temperate grass-lands. This region is suitable for *cattle*- and *sheep-rearing*, and has a number of great cattle stations and sheep runs.

THE EAST COAST REGION.—South of the tropic and extending to the beginning of the Victoria peninsula, the east coast and the eastward slopes of the highlands have a warm temperate climate, the mean temperature varying from about 50° F. in winter to 70° F. in summer, with a rainfall of between 20 and 40 inches per annum, falling chiefly in summer. Much of the region is well clothed with magnificent temperate and sub-tropical *forests*, containing many species of the *eucalyptus* tree, while the excellent pastures make *cattle*- and *sheep-rearing* and *dairying* important. Good crops of *cereals*, including maize and

wheat, and *fruits*, such as apples and oranges, are produced. In the northerly parts, the conditions are suitable for the production of *tea*, *cotton*, and *silk*.

THE TEMPERATE GRASS-LANDS.—This region extends south from the savannahs on the inner side of the eastern highlands, and comprises most of the Murray-Darling basin. It thus includes the *Riverina District*, the region lying between the Murray and Murrumbidgee, which is a great pastoral and agricultural region. The rainfall is low and gradually decreases towards the west, till, in the Lake Eyre district, semi-desert conditions appear. The whole of the region is liable to suffer from long droughts and irrigation works are therefore a necessity before economic development can take place. The great success of the Burrinjuck Dam project has shown what can be done in this way. This dam has been constructed on the Murrumbidgee River where it passes between two great hills, "Black Andrew" and "Barren Jack," and the large lake thus created is capable of storing 33,000 million cubic feet of water. It has brought more than 100,000 acres of sheep pasture under crops. The region excels in the production of *wool* and *wheat*, while all the irrigated areas produce Mediterranean and deciduous fruits, and several are important dairying districts.

THE MEDITERRANEAN REGION.—The Spencer and St. Vincent Gulf district and the south-west corner of Western Australia comprise the Mediterranean region. Here the rain falls during the winter and the climate is of typical Mediterranean character. In the wetter and more elevated areas forests containing *jarrah* and *karri* woods occur, while the lowlands produce cereals, especially *wheat*, and fruits such as the *olive* and *grape*. The latter has given rise to a flourishing *wine* industry.

THE TASMANIAN REGION.—This region comprises the island of Tasmania and the extreme south of Victoria. The climate is of the cool temperate type with rain occurring throughout the year. Much of the region is *well wooded* and *fruit growing*, e.g., *apples*, and *sheep*- and *cattle*-rearing are important industries.

THE ARID INTERIOR.—South of the savannahs and west of the grass-lands the interior of the continent suffers from great scarcity of rainfall, and desert conditions prevail. This region extends to the middle of the west coast and to the shores of the Great Australian Bight. It comprises almost a third of Australia and contains no streams of value and none which flow throughout the year. Round the margins sheep are reared. In the west, desert settlements have been established on the *gold-fields*, but they have been made possible only by the laying of hundreds of miles of pipes for the supply of water from the coast.

INDUSTRIES AND PRODUCTIONS

Forestry.

As so much of the country is too dry for tree growth, the forested area is comparatively small. In the past, too, there has been much indiscriminate felling of trees with no thought for the future, and, consequently, the Commonwealth's timber resources to-day form one of the least important portions of her natural wealth. Forestry is, therefore, not an important industry, and indeed the imports of timber, as in the case of South Africa, cost the country several millions of pounds per annum. Nevertheless, the remaining forests contain many valuable and distinctive trees, of whose timber there is a considerable export, principally from Western Australia. Here, in the south-west, are found the *jarrah* and *karri*, both of great commercial value: the former, a species of eucalyptus, being much used for the construction of wharves and docks, owing to its being practically impervious to moisture, and the latter supplying the wooden blocks used in street paving. The *iron bark* and *blue gum* of the eastern highlands also are exported to some extent, both being valuable timbers for harbour works. During the Great War state forestry departments were organised, and these are taking measures to protect the remaining forests and to stimulate afforestation.

Fishing.

The fisheries, too, are relatively unimportant and give employment to but few people. The inshore waters, and the rivers of the south-east, however, are well stocked with edible fish, though at present they provide none for export. With the *oyster* fisheries of the coastal inlets of New South Wales and Queensland they do no more than satisfy the home demand, though, properly fostered, fishing might well develop into an industry of national importance. Off the tropical northern coasts and on the Great Barrier Reef, however, *bêche-de-mer* fishing, for export to China, is carried on by Malays and Chinese, and *pearl shelling* is important along the tropical coasts from Sharks Bay, in Western Australia, to Torres Strait, north of Cape York, in Queensland. The shells provide *mother-of-pearl* and are exported in considerable quantities, and pearls also are obtained.

Out of an estimated total production for 1924-25 valued at over £449,000,000, the products of the forests and fisheries were worth only about £12,000,000.

Pastoral Industries.

The products of the Commonwealth which, up to the present, have formed the chief sources of her wealth, and on which her prosperity has been based, are those raw materials and food-stuffs

which are in most demand in the manufacturing countries of the northern hemisphere. Chief among these bases of her prosperity is *wool*.

SHEEP.—Australia is the greatest wool-producing country in the world, both as regards the quantity and quality of the wool produced, and the number of sheep in the Commonwealth far exceeds that of any other animal, there being over 93 millions in 1924. The character of the country, the climate, which keeps the sheep singularly free from disease and renders winter housing unnecessary, and the skill and enterprise of the sheep-breeders have combined to place Australia in the premier position in the world's wool trade. Wool represents about half the aggregate value of her exports, and buyers from all the great wool-manufacturing countries come year by year to Australia for the auction sales.

The value of the clip varies considerably from year to year, according to the number of sheep and the price of wool, 1925-26, when the sales totalled over 2,600,000 bales, valued at over £57,700,000, being a record year in this respect. The limit of wool production, however, has by no means been reached. The number of sheep kept has been much greater than it is to-day (106,420,000 in 1891), though the amount of wool obtained per sheep has never been higher. Also, the construction of railways and the development of irrigation, both from artesian wells and by means of dams across the rivers, has not only rendered the industry much less precarious, but has opened up new areas. Formerly, thousands of the sheep reared on the salt bush died annually from drought, with which the farmers were powerless to cope. These developments should do much to counter-balance the effect of the progress of agriculture and dairying, which have made much headway at the expense of sheep-farming. Further, the rabbit scourge, which so seriously decreased the carrying capacity of the land, is at last being overcome. Hundreds of thousands of miles of rabbit-proof fencing have been erected, and constant war has been waged against the pests—so successfully that a considerable export trade has developed in frozen rabbits and hares and their skins.

New South Wales, carrying about 50 million sheep, is the chief sheep-farming state, for it possesses ideal pastures in the rolling temperate grass-lands which cover such a large portion of its area. Here, and throughout the country generally, the merino sheep, which is reared for its fine wool and thrives best in a dry climate, predominates in the interior, while the heavier cross-bred, reared chiefly for its meat, is kept in the largest numbers on the wetter coastal lands. *Queensland* has the second largest number of sheep, carrying more than 20 millions, *Victoria* following with 14 millions, *South Australia* and *Western Australia* each with 7 millions, and *Tasmania* with 2 millions. The

numbers in North Australia and Central Australia, the area formerly known as the Northern Territory, are at present small, but when railway connections have been established, the industry should undergo great development here. Also, the number of sheep in Western and South Australia is capable of much expansion, and, as experience has proved that sheep pay better than cattle, it seems probable that sheep-farming will develop until the Commonwealth contains at least 30 per cent. more sheep than are carried to-day.

Until comparatively recent years *wool*, *skins*, and *tallow* were practically the only products of the industry which could be marketed overseas, but with the invention of refrigeration machinery and its application to land and ocean transport, the importance of the industry, already immense, was increased by the development of an export trade in *frozen mutton*. This has rapidly assumed important dimensions, the value of the export increasing from £492,000 in 1903 to £4,322,000 in 1923.

CATTLE.—The cattle in the Commonwealth number between 13 and 14 millions, more than half the total being found in *Queensland*, on the tropical grass-lands and savannahs which stretch away westward into North and Central Australia. Here in the heart of the continent are found the great cattle stations, for it is a vast, young country, deficient in rivers, it is true, but well supplied with underground water, which, when tapped by an artesian bore gushes out at the rate of millions of gallons a day, making settlement possible and bringing great prosperity. It is a land admirably suited to the raising of fine beef-cattle, and large meat-packing works are in operation at Townsville and Rockhampton, in Queensland, and Port Darwin, in North Australia.

Cattle are found throughout the savannah region, but enormous areas of suitable country are still unoccupied. In Queensland, many stations range in area from 2,000 to 5,000 square miles, each carrying from 10,000 to 50,000 head of cattle, and the different stations from Vanrook, in the Gulf district, to Buckingham Downs, near Boulia, carry a total number of about 7,000,000 head. It is in North Australia, however, that the largest stations are to be found. The Victoria Downs and Wave Hill stations are each more than twice as large as the whole of Yorkshire, and there are many stations on which England's largest county might be placed and still leave some room to spare. Once a year the cattle are rounded up and taken to the yards, for the branding of the young stock and the drafting of the "fats" into paddocks before being sent to the packing centres or the markets of Brisbane and Adelaide. Sometimes these cattle, which are sent away in mobs of several hundred head, have to travel 2,000 miles along the stock routes before reaching the coastal resting and fattening paddocks.

On the wetter coastal lands in New South Wales and Victoria more attention is paid to the rearing of cattle for milk, butter, and cheese than for meat, and *dairying* is an important industry, leading to a large and growing export of *butter*. Considerable, though much smaller, quantities of *condensed milk* and *cheese* also are exported. The export, too, of *tinned* and *frozen beef* is considerable, though it cannot compare with that of frozen mutton. The great distance of Australia from the meat markets of the northern hemisphere will always place her at a disadvantage when compared with such beef-producing countries as Argentina, for the beef has to be frozen hard to arrive fresh, while Argentine beef may be merely chilled, and it has to stand the higher freight rates. There is a valuable export of *hides* and a small but increasing export of *leather* in connection with the industry.

OTHER ANIMALS.—The *horse-rearing* industry is chiefly important in connection with the local market, though there is a considerable export, mainly to India. The number of horses in the Commonwealth is about $2\frac{1}{4}$ millions, and they are reared chiefly in Queensland, New South Wales, and Victoria.

In the dairy-farming regions considerable numbers of *pigs* are reared, though the total for the Commonwealth is less than a million. Bacon and ham are being produced for export on an increasing scale, though the amount sent overseas is still comparatively small.

The number of *camels* in Australia is about 10,000. Originally obtained from Afghanistan, they are now reared in Western Australia, South Australia, and the western margins of New South Wales, and, used as transport animals in the desert regions, they are of great utility.

The *angora goat* thrives in the drier sheep-rearing districts, where it is found in small but increasing numbers, and the mohair industry seems capable of great expansion.

Agricultural Industries.

One of the most marked features of the economic development of Australia during the twentieth century has been the steady growth in importance of agriculture, and the premier position held by the pastoral industry is now being seriously challenged. The great hindrance presented by the scarcity and uncertainty of the rainfall is being overcome in many districts by the construction of dams to store up the flood water of the rivers and by the sinking of artesian bores, and, in other districts of low rainfall, by the adoption of "dry farming" methods, by which the rainfall is conserved in the subsoil until there is sufficient for the requirements of the crop, thus ensuring a good crop at least once every two years. Again, much land previously reserved for sheep has been brought under the plough.

The Federal Government, too, has an ambitious scheme for the furtherance of agricultural development. The object of the scheme is to make use of every available acre and to increase the productivity of the cultivated areas by scientific methods. Research has been instituted to combat plant diseases and to promote wheat growing. In these ways the area under crops has steadily increased until it is now over 17½ million acres.

WHEAT.—About 60 per cent. of the ploughed land is under wheat, which is by far the most important of the crops produced. *New South Wales* is the most important wheat-growing state, having over 3½ million acres devoted to its cultivation, but *Victoria* and *South Australia* each has about 2½ million acres under wheat, and *Western Australia* is not far behind, having over 2 million. *Queensland* and *Tasmania* fall a long way behind, though each produces considerable quantities. In the south-west corner of *Western Australia*, the *Spencer* and *St. Vincent Gulf* region of *South Australia*, and the neighbouring districts of *Victoria*, the hot dry summers ripen off the grain to perfection, but the coastal lands of *Victoria* and *New South Wales* are too wet for its successful cultivation. Behind the highlands, however, there is a great wheat belt several hundred miles wide stretching through both states and including the fertile *Riverina* district. Here irrigation and dry farming have effected a great increase in the area which can profitably be sown with wheat, the irrigated regions of the lower *Murray*, round *Wentworth*, *Mildura*, and *Renmark*, and of the *Riverina* and the *Wimmera* country of *Victoria*, the richest wheat land in the Commonwealth, being extremely productive. It is noteworthy that, though wheat has in many instances largely encroached on the sheep runs, the two industries are by no means antagonistic. Indeed, the tendency is to regard sheep farming and wheat growing as companion industries, for not only are the sheep an additional source of profit, but they prove very valuable in the successful management of the land, being run on the fallow during the early spring to keep down the weeds and enrich the soil.

Though the production of wheat is already great—the average annual production from 1915-25 was over 124 million bushels—a substantial increase should be possible even without further extending the wheat area. Cultivation methods have greatly improved, and this, with the development of irrigation, has removed the fear of droughts. In all the states, however, and chiefly in *Western Australia*, there are still large areas of suitable land, and there remains an area of some 25 million acres still available for wheat farming.

Wheat now forms the second most valuable of *Australia's* exports, and it finds a ready market in *Western Europe*, arriving

as it does when the supplies from Canada and the United States are nearing exhaustion.

HAY.—After wheat, by far the largest area under crops is devoted to the production of hay. This is grown over large areas throughout the Commonwealth as a food for sheep, cattle, and horses, for, unlike the grasses of the Canadian prairies, which turn to hay where they stand, thus providing a natural winter food, the grasses of Australia are poor and wither up at the end of the summer. The hay is not made of meadow grass but of oats, barley, or wheat which are cut when green. Also, considerable quantities of *lucerne* hay are produced, especially in Queensland and New South Wales.

OATS.—The third most extensively cultivated crop is oats, and this, with *barley* and *potatoes*, is widely grown throughout the Commonwealth.

MAIZE.—Queensland and New South Wales are the only states growing maize at all extensively for grain, though in all states it is cultivated to some extent as green forage, especially in connection with the dairying industry. The grain is cultivated in the hotter and wetter valleys of northern New South Wales and southern Queensland, but in the tropical north it flourishes so well that two crops may be produced in the year. At present, however, the yield, though steadily increasing (12½ million bushels in 1924-25), is not sufficiently large to provide a surplus for export.

SUGAR-CANE.—The area under sugar-cane has gradually increased until, in 1924-25, it reached nearly 274,000 acres, and the sugar industry has become one of great national importance. The cane is grown for the manufacture of sugar in the coastal districts of *Queensland* and northern *New South Wales*, though much more extensively in the former state than in the latter. The industry is remarkable in that no coloured labour is employed, a condition which was regarded by many as likely to prove a great stumbling-block to its development. Production now more than meets local requirements and a considerable export trade is developing. Nevertheless, it is estimated that in Queensland alone there are at least 500,000 acres of suitable land which might be brought into bearing within reasonable distance of existing sugar mills. In *Victoria* there is a considerable production of sugar from the *sugar-beet*.

GRAPES.—The vine is grown extensively in the "Mediterranean" districts of *South Australia* and *Victoria*, and to a less extent in the south-west of *Western Australia*. In the last named region, however, the industry is capable of much expansion, for, throughout all these areas, the climatic requirements of the plant are exactly met. A considerable and growing

wine industry has developed and for many years the Commonwealth has carried on a steady export trade, particularly with Great Britain, in wines of the Burgundy type. *South Australia* is both the largest producer and exporter, producing about five times as much wine as the rest of Australia, but both Victoria and Western Australia participate. The production approximates to 14 million gallons a year, and this quantity can be much increased, though the industry has to overcome the prejudice in favour of the wines of tradition and reputation produced in France and Portugal, by no means a light task. The quality of the Australian wines is excellent, however, and it seems likely that they will some day form a large percentage of the wines consumed in the British Isles.

The *brandy* industry has been established and has practically driven the imported spirit from the local market, but there is at present no export. The *raisin* and *currant* industry is important and normally provides a surplus for shipment overseas. This will probably increase very largely during the next few years.

OTHER FRUITS.—Besides the grape, many other fruits are grown. On the tropical coast of Queensland, *bananas* and *pine-apples* are grown in large quantities; citrus fruits, such as *oranges* and *lemons*, are grown in sub-tropical New South Wales and Queensland, especially in the Murray Valley and Paramatta and Hawkesbury River districts of the former; *pears*, *apricots*, *peaches*, *figs*, *olives*, and *almonds* are produced largely in the Mediterranean regions; the *stone and soft fruits* of Britain are produced in large quantities in New South Wales, Victoria, and Tasmania; and last but by no means least, *apples*, the main fresh fruit crop of the Commonwealth, are produced in Victoria, Tasmania, Western Australia, South Australia, and the south of New South Wales.

The cold storage facilities provided by modern liners has led to the establishment of a great export trade in *fresh fruit*, and the success of the sugar industry has stimulated the production and export of *preserved fruits*. There is also an increasing export of *dried fruits*. The enormous importance of the advance made with the advent of cold storage facilities is strikingly illustrated by Mr H. S. Gullett in *The Opportunity in Australia* (1914).¹ He says: "Only a few years ago fruit could scarcely be given away in Australia. I have recollections of feeding pigs and calves with prime apricots and peaches, and of seeing plums of excellent quality drying on the branches or rotting on the ground. In those days—some sixteen or twenty years ago—we were almost entirely dependent upon the local markets. Summer would come and the first fruit would ripen. For a week all would be well. Peaches and apricots would sell in

¹ Quoted by Dr. Newbigin in *Commercial Geography* (Williams & Norgate).

Melbourne at high prices, and the heart of the orchardist rejoiced. Then would come a few hot days ; all through the orcharding districts fruit would ripen with a rush. In a week the market was hopelessly glutted, and our selling agents in the cities would send us letters asking for remittances to cover loss on our consignments. It was then that the pigs and calves became useful, for at that time the Australian orchardist, with few exceptions, knew little or nothing of fruit drying or canning, and the operations of the local pulping and jam factories were limited. . . . To-day our orchards are profitable and are expanding rapidly. . . . The sudden change in outlook is easily explained. It is due solely to the advent of cold storage facilities both on land and on the steamships trading between Australia and the outside world."

COTTON.—In the tropical regions the soil and climatic conditions are eminently suitable for the growth of cotton, and the cultivation of the crop has made considerable headway in Queensland, under the stimulus provided by a Government bounty. The production increased from 19 bales in 1919-20 to 14,400 in 1924-25, and it is hoped that the industry will become firmly established. As Australia is unwilling to admit cheap, coloured labour, however, the future of cotton cultivation in Queensland seems to depend on the production of high-grade, long-staple cotton, the price of which is independent of the fluctuations in American supplies. Already, in 1925 and 1926, the record output of the United States has involved the Commonwealth Government in heavy losses on subsidised cotton growing. It is the human factor which is paramount here, for if the problem of the cost of production could be satisfactorily solved, Australia might well produce large supplies of excellent cotton.

Mining.

As in South Africa, the comparatively rapid development of the Commonwealth has been due to its wealth in minerals, for the search for gold not only led to the opening up of much of the country but caused the development of the agricultural and pastoral resources, many of the unsuccessful gold-seekers, unable to return to their homes across the sea, settling on the land. Australia, however, differs from the Union in that the products of the pastoral and agricultural industries now far exceed in value those of the mines. The vast and varied mineral resources must, however, play an increasingly important part in the future, for, while up to the present the *gold* resources alone have been fully exploited, the richness of the deposits of *coal*, *iron*, and many other metals is well known and most of the minerals required in modern industry are to be found. A noteworthy feature of Australian mining is that the labour employed is necessarily white.

GOLD.—The rich placer mines and alluvial deposits which led to such a great influx of gold-seekers in the fifties have long been worked out and the ore is now obtained by means of shafts sunk deep into the earth, in some cases as deep as 4,000 feet. As in South Africa, the operations of obtaining the ore from the quartz and of separating the gold are complicated, involving much expensive machinery, and can, therefore, be carried out successfully only by great mining companies. Consequently, the gold output of Australia has steadily declined for many years. Whereas in 1909 nearly 3 million ounces were obtained, in 1925 the output was little over half a million, and the Commonwealth has now dropped from third to fourth place among the world's gold producers. Further, unless new rich discoveries are made, its production is destined to continue its steady decline.

Western Australia is now the greatest producer, its output in 1925 being more than three-quarters of the total for the whole of the Commonwealth. The chief field is in the *Coolgardie* district, other fields of less importance being the *Mount Margaret*, to the north-east of Coolgardie, the *Yilgarn*, to the west, and the *Murchison* field to the west of Mount Margaret. The chief mining centres of these desert goldfields are *Kalgoorlie* and *Coolgardie*, *Malcolm* and *Laverton*.

In *Victoria*, the next largest producer, considerable quantities are still obtained from the once rich mines of *Ballarat* and *Ben-digo*, as well as from other centres. The output, however, shares the general decline. Throughout their length, the eastern highlands are metalliferous and, consequently, all three of the eastern states are important mineral producers. From the *Mount Morgan*, *Gympie*, and *Charters Towers* fields of *Queensland* almost as much gold is obtained as from those of Victoria, and considerable, though much smaller, quantities are mined in *New South Wales*, chiefly in the *Cobar* district. Still smaller quantities are obtained in Tasmania, Central Australia, and South Australia.

Though gold has been dealt with first among Australia's minerals, it is only on account of the age of the industry and its great effect on the early development of the continent that it has thus been accorded priority of place, for gold now falls far behind *coal* in the value of output.

COAL.—The coal-fields of the Commonwealth form an asset of incalculable value, and while the coal production has steadily increased during recent years, thus marking an advance in industrial development, there are still great untapped reserves, amounting to about two-thirds of those of Britain. By far the most important coal-fields are those of *New South Wales*, which extend in a semi-circle round Sydney, to *Newcastle* in the north, *Lithgow* in the west, and *Bulli* in the south. This great coal basin produces about 70 per cent. of the total output of the

Commonwealth, and large quantities are exported from Newcastle and Sydney, both to other parts of the continent and to New Zealand and foreign countries, chiefly South America and the Far East. Next in value to the New South Wales fields are those of *Queensland*. Here considerable quantities of coal are mined near *Ipswich*, smaller quantities being obtained at *Clermont*, near Rockhampton. In the Gippsland region of *Victoria* there are enormous deposits of brown-coal, those in the neighbourhood of *Morwell* alone being practically inexhaustible. The exploitation of these has been undertaken under the direction of the State Electricity Commission with the object of establishing a comprehensive scheme of electrical power generation and transmission. This is progressing rapidly, and the effect on the industrial and social development of Victoria is certain to be great. In *Western Australia* coal mined at *Collie*, about 40 miles inland from the port of Bunbury, is useful for bunkering ships which call at Fremantle and Albany. Considerable quantities also are mined in *Tasmania*, principally in the region round *Fingal* in the east.

SILVER, LEAD, and ZINC.—These metals, found in the same mines, are obtained in large quantities, the combined value of the silver and lead production being greater than that of gold. *New South Wales* is by far the greatest producer, *Broken Hill*, on the western border of the state, being the chief centre of a rich mining region. Considerable quantities of silver are obtained also at *Chillagoe*, near Cairns, in northern *Queensland*, and at *Zeehan*, in western *Tasmania*. The silver-lead from the Broken Hill mines is taken to the great smelting works of *Port Pirie*, on Spencer Gulf.

COPPER.—At one time the chief copper-producing state was South Australia, but the largest quantities are now obtained from the *Mount Lyell* district, on the west coast of *Tasmania*, and from the *Cloncurry*, *Mount Morgan*, and *Etheridge* regions of northern *Queensland*. In South Australia, however, copper-mining is still the chief mineral industry and considerable quantities are obtained from the mines of *Moonta* and *Walleroo*, on Spencer Gulf. *Western Australia*, also, has a considerable production, copper being found associated with gold, especially in the *Mount Margaret* and *Pilbarra* districts. There is a small production in the *Cobar* district of *New South Wales*, but the output is only a fraction of what it once was, and is further decreasing. The South Australian ore is smelted at *Port Pirie* and *Walleroo*.

TIN.—The chief tin-mining state is *Tasmania*, about a third of the total production of the Commonwealth being obtained from the *Mount Bischoff* region in the north-west and various parts of the north-east and east. *Queensland*, however, is a

close second, and considerable quantities are mined at *Herberton* in the north and at *Stanthorpe* in the south-east. Smaller, but still important, quantities are obtained from behind the New England Range in *New South Wales*.

IRON.—Though iron ore occurs very widely in Australia it is mined on a large scale only at *Iron Knob* in *South Australia*. The output of these mines used to be smelted at Port Pirie, but it is now shipped to the *Newcastle* coal-fields, where large iron works have been established. New South Wales ores are mined and smelted near *Lithgow*.

OTHER MINERALS.—Good *building stone* is plentiful throughout the Commonwealth, and many of the rarer minerals, such as *antimony*, *arsenic*, *bismuth*, *cobalt*, *mercury*, *tungsten*, and precious stones (*opals* and *diamonds*) are found, though they are not mined to any great extent and are at present of little economic importance.

Manufactures.

The population of the Commonwealth is still too small to permit of manufacturing industries developing on a large scale, and Australia remains a great producer of raw materials and food-stuffs, which she exports to the great industrial countries of the world, from whom she obtains most of her requirements in manufactured goods. Nevertheless, there is an increasing desire in Australia that she should work up the raw materials she produces and establish strong home manufacturing industries; a desire much fostered during the period of the Great War, when the difficulty of securing adequate supplies of essential requirements from overseas was severely emphasised. At present manufactures are developed only in districts, such as those round Melbourne and Sydney, where the population is relatively dense, and the growth of Australia as a manufacturing country is dependent on increased immigration, leading to a larger home market. It is significant, however, that even now the value of the production of the manufacturing industries of the Commonwealth is greater than that of any other industry, in 1925 nearly £138,000,000 worth of manufactured goods being produced.

New South Wales, with its great coal-field, and *Victoria*, with its ample supplies of electricity generated from brown coal, are the chief manufacturing states. In both, the manufacture of *textiles* and *clothing*, *metal goods* and *machinery*, and the preparation of *food-stuffs* and *drinks* are the most important manufacturing industries, others of less importance being *saw-milling*, and the manufacture of *paper*, *transport materials*, *leather* and *leather goods*. In *Tasmania* the abundant supplies of water power have led to the establishment of important electro-metallurgical industries. The electrolytic zinc works at Risdon, near Hobart, using both ores from Broken Hill and those obtained

locally, have a large output of *zinc concentrates*, while the *carbide* works at North-West Bay are able to supply the needs of all Australia.

The preparation of food-stuffs such as *flour, sugar, butter, cheese, tinned meat and fruit*, and the preparation of *wine*, are, however, the manufacturing industries whose products enter most into world trade. In all the large towns there are many industries which owe their existence to the local demand.

COMMUNICATIONS

Like South Africa, Australia is deficient in navigable waterways, the only rivers which can be used for any considerable distance being the *Murray* and its tributaries, the *Darling* and the *Murrumbidgee*. During the rainy season these rivers are navigable for long distances by shallow-draught vessels; the *Murray* as far as Albury, 1,700 miles from its mouth, the *Darling* for 1,000 miles above its confluence, and the *Murrumbidgee* for several hundreds of miles from its junction with the main stream. Communication with the sea, however, is made impossible by the sand bar at the mouth of the *Murray*, and thus the greatest rivers of the Commonwealth are of use as means of transport only for the movement of cargoes of wool, wheat, etc., to the nearest railway station situated on their banks. This poverty in natural means of communication and the aridity of the greater part of the interior have resulted in the settlements being confined mainly to the coastal lands and early accentuated the importance of the coasting traffic. They account for the great present importance of the *railways*.

Railways.

The disjointed nature of Australia's railways is at once apparent from a glance at Fig. 37. In most cases they consist of short lines connecting seaports with mining or farming centres in the interior, and it is only in the populous south-east, in Victoria and New South Wales, that there is any network of lines. In each of the states, the railways are owned and controlled by the state government, the Federal Government having, in addition, a trans-continental line and several smaller lines, and this has resulted in the outstanding defect of the Australian railway system, if such it can be called. Most of the lines were constructed by the various states at a time when the prospect of federation seemed very remote and each used the gauge which it considered most suitable. Thus, in *Victoria* and *South Australia* most of the state lines are built on a 5 ft. 3 in. gauge with a smaller mileage on 2 ft. 6 in. gauge in Victoria and 3 ft. 6 in. gauge in South Australia. In *New South Wales* the British standard of 4 ft. 8½ in. was adopted, though there is a small

mileage on 3 ft. 6 in. gauge, while *Queensland* and *Western Australia* both chose the 3 ft. 6 in. gauge. After federation, the Commonwealth Government decided that the 4 ft. 8½ in. gauge was the most suitable and constructed the *Trans-Australian Railway*

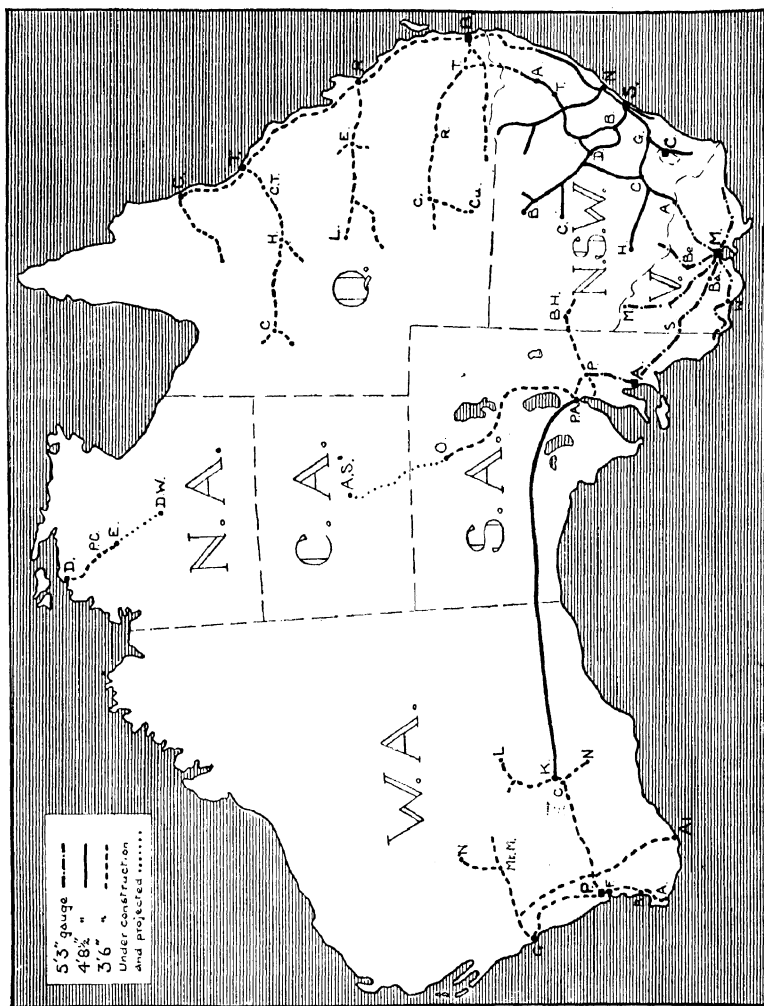


FIG. 37.—THE PRINCIPAL RAILWAYS OF AUSTRALIA.

accordingly. Thus there is a complete muddle of gauges, and no fewer than five changes of train are necessary in making the journey from Brisbane to Fremantle. Unification of gauge is, therefore, an urgent need, for the breaking of bulk necessary in the transportation of goods and live stock is very costly both in time and money. A Royal Commission which sat in 1921

advocated the re-laying of all lines between Brisbane and Fremantle not already constructed on the 4 ft. 8½ in. gauge, but it was reported that the cost would be £57,200,000, a figure which some experts asserted would have been more correctly given as £100,000,000. The recommendation was, however, accepted in principle and no doubt the necessary unification will be effected in time, though it will be many years before this much desired result is achieved.

The capitals of Queensland, New South Wales, Victoria, South Australia, and Western Australia are all important railway centres and, since the completion of the *Trans-Australian Railway* in 1917, all are inter-connected. The chief railways radiating from these centres are as follows :—

QUEENSLAND.—From *Brisbane* there are four important lines : one runs northwards along the coastal plain to *Cairns*, the centre of a great sugar and fruit-growing region, passing through *Gympie*, *Maryborough*, *Bundaberg*, *Gladstone*, *Rockhampton*, *Mackay*, *Bowen*, *Townsville*, and *Cardwell* ; the second passes through the coal-mining region round *Ipswich* and climbs the edge of the highlands to *Toowoomba*, the centre of a fertile agricultural district, continuing inland across the Darling Downs and passing through *Roma* to the pastoral centres of *Charleville* and *Cunnamulla* ; the third line leaves the second at *Toowoomba* and follows the New England plateau through *Warwick* and the tin-mining centre of *Stanthorpe* to the New South Wales border ; the fourth passes south along the coastal plain to connect with the line from *Newcastle* in New South Wales.

From *Rockhampton* a line runs inland through *Mount Morgan* and *Emerald* to *Longreach*, and farther north there are other lines similarly serving the coastal plantations and agricultural districts and the mining and pastoral centres of the interior. The chief of these are the lines from *Townsville* through *Charters Towers* and *Hughenden* to *Cloncurry*, and from *Cairns* to *Forsyth* on the *Etheridge* goldfield.

NEW SOUTH WALES.—From *Sydney* railways run in all directions : (1) northwards along the coastal plain through the great coal-mining and industrial region round *Newcastle* to the Queensland border. From *Newcastle* a second connection is made with the Queensland system by a line which climbs the escarpment by the Hunter Valley through the farming districts round *Maitland* and *Singleton* to the Liverpool Downs, and passes north along the plateau through *Tamworth*, the centre of a rich mixed farming district, and the pastoral and mining centres of *Armidale* and *Tenterfield*. From this line branches serve the agricultural and pastoral district of the upper Darling. (2) Running inland through the fruit-farming region round *Paramatta*, an important line climbs the edge of the highlands to *Lithgow* and *Bathurst*, passing through *Dubbo* to *Bourke*, on

the Darling, a great collecting centre for the wool produced in the surrounding districts. From this line branches run to the copper and gold-mining centre of *Cobar* and the farming districts of the Lachland River region. (3) A third crosses the coastal plain and utilises the upper valley of the Hawkesbury to reach the plateau, passing through a rich pastoral and agricultural region *via Goulburn, Cootamundra, and Wagga Wagga to Albury*, on the Murray, where a bridge provides connection with the Victoria railways. This line has branches running to *Canberra* and to *Hay*, on the Murrumbidgee, in the great farming area irrigated by the Burrinjuck Scheme, and serving the Riverina District. (4) A fourth line runs southward along the coast to the coal-mining and export centres of *Wollongong* and *Nowra*.

VICTORIA.—From *Melbourne* railways radiate in all directions. (1) Eastward a line runs through the great cattle-breeding, dairy farming and mining district of Gippsland. (2) North-eastward a line passes over the Victoria Highlands to *Wodonga*, on the Murray, opposite Albury, providing a connection with the New South Wales system and serving a rich farming district. (3) Northward there is a line serving the mining centre of *Bendigo*, which is also the centre of a rich agricultural district, and passing on to *Echuca*, on the Murray, whence a line serves the Riverina District. (4) Passing north-westward through the great wheat-growing and wool-producing districts of the Mallee and Wimmera to the irrigated fruit-producing region round *Mildura*, on the Murray. (5) Westward a line passes through the gold-mining centre of *Ballarat* and the agricultural and pastoral centre of *Horsham* to *Serviceton*, on the border of South Australia. (6) South-westward a line runs *via Geelong*, a great port for the export of wool and a wool manufacturing centre, and the agricultural and dairying centres of *Warrnambool, Hamilton, and Portland* to the South Australian border.

SOUTH AUSTRALIA.—From *Adelaide* lines run as follows: (1) South-eastward and eastward through a rich agricultural, pastoral, and fruit-growing region to connect with the Victorian railways. (2) Northward across the Mount Lofty and Flinders Ranges through *Peterborough*—whence there are important branches westward to *Port Pirie* and eastward to *Broken Hill* in New South Wales—to *Port Augusta*, a great wheat port. This railway continues northwards, as a Federal line, through arid scrub-lands to *Oodnadatta*, whence construction is being continued as far as *Alice Springs*, in the Macdonnell Range, the capital of Central Australia. (3) Eastwards from *Port Augusta* the *Trans-Australian Railway* passes across the arid plains to *Kalgoorlie*, where it connects with the Western Australian railways.

WESTERN AUSTRALIA.—From *Perth* lines radiate northward to *Geraldton*, whence a line passes inland to *Mount Magnet* and

Nannine, on the Murchison goldfield ; eastward, *via* the valley of the Swan, across the Darling Range, to serve the great gold-mining centres of *Coolgardie*, *Kalgoorlie*, *Menzies*, *Mount Margaret*, *Laverton*, and *Norseman* ; southward along the coastal plain *via* *Bunbury*, the port for the Collie coal-field and for the shipment of timber from the jarrah and karri forests, and *Busselton*, also a timber port and the outlet of a rich agricultural district, to *Augusta* ; and southwards across the plateau to *Albany*, the port of the south coast and the best natural harbour of Western Australia.

NORTH AUSTRALIA.—From *Port Darwin*, the capital of the state, a line runs south through the tropical forest region to the cattle-rearing savannah country round *Pine Creek* and *Emungalan*. This is being extended to *Daly Waters*, and no doubt the gap between this point and Alice Springs will be bridged in years to come, thus forming a north-south trans-continental line.

TASMANIA.—From *Hobart* the railway runs north through fruit-farming and lumbering districts to *Launceston*, on the Tamar, with a branch down the South Esk valley past the *Fingal* coal-field to *St. Mary's* on the north-east coast. From near *Perth*, south of *Launceston*, the main line strikes west through rich agricultural land and follows the Mersey valley to the north coast. At *Burnie* it turns south-west and passes *via* the tin mines of the *Mount Bischoff* region, the silver mines of *Zeehan*, and the copper mines of the *Mount Lyell* district to *Pillingner* at the head of *Macquarie Harbour*.

Air Services.

The air services inaugurated in 1921 have proved a boon to the widely scattered centres of Western Australia, North Australia and western Queensland.

At present there are five commercial airways in operation. (1) From *Perth* to *Derby*, *via* *Geraldton*, *Carnarvon*, *Whim's Creek*, *Onslow*, *Roebourne*, *Port Hedland*, and *Broome*. Before the establishment of this service the only method of travel between the centres served was by coasting steamer, and the great saving of time effected by the air service is of great assistance to all business people. The service will in time be extended to *Port Darwin* *via* *Hall's Creek* and *Wyndham*. (2) The *Charleville* and *Camooweal* airway, linking up the inland railway termini of the Brisbane-Charleville, Rockhampton-Longreach, and Townsville-Cloncurry lines. It is hoped that this service will eventually be linked with the Western Australian service by an extension to *Port Darwin*. (3) *Adelaide* to *Sydney*. (4) *Melbourne* to *Hay*. (5) *Mildura* to *Broken Hill*.

All these services have amply proved their worth and they

are destined to form the nucleus of a great Australian airway system, probable future routes being Perth to Adelaide; Melbourne to Tasmania; Melbourne to Sydney *via* Canberra; and Sydney to Brisbane *via* Newcastle.

COMMERCE AND PORTS

The external trade of the Commonwealth has reached enormous proportions and, further, is steadily increasing. In 1924-25 goods to the value of over £157,000,000 were imported, while those exported were valued at over £162,000,000. In that year the United Kingdom supplied nearly 44 per cent. of the imports and took nearly 43 per cent. of the exports and thus the bulk of the trade is carried on with the Mother Country. The amount of trade carried on directly with other countries of the Empire and with foreign countries, however, has greatly increased in recent years and this is significant of Australia's national development. It is not so many years ago that she was entirely dependent on the Mother Country, marketing her produce through Great Britain and receiving almost all her imports from the same source. In 1924-25 nearly a quarter of her imports (by value) came from the United States, largely as a result of the opening of the Panama Canal, and other important sources of supply were, in decreasing order, India, the Dutch East Indies, the Union of South Africa, France, Japan, Canada, Germany, New Zealand, Ceylon, Italy, and Belgium. After Britain, the best customers of Australia were, in order, France, Japan, Italy, the United States, Germany, Belgium, New Zealand, the Union of South Africa, the Dutch East Indies, India, Ceylon, and Canada.

Wool and wheat are by far the most important exports, followed by *dairy produce* (chiefly *butter*), *meats* (chiefly *frozen mutton*), *hides and skins*, *minerals* (chiefly *gold, lead, silver, and zinc*, but also *coal and copper*), *sugar, fruits* (fresh, dried, and canned), *timber*, and *tallow*. The chief imports are *metals and metal goods* (including *machinery, motor-cars, railway stock, and agricultural implements*), *textile materials and clothing, petroleum, rubber and rubber manufactures, drugs and chemicals, tea, tobacco, and stationery and books*.

New South Wales is the leading state in foreign trade, followed by Victoria, Queensland, South Australia, Western Australia, and Tasmania. The external trade of North Australia and Central Australia is at present very small.

The chief seaports of the Commonwealth are as follows :—

SYDNEY is the chief port of Australia and the capital of New South Wales. Its position was assured in the early days of colonisation, when its beautiful bay attracted Captain Cook, and the site was afterwards utilised as a convict settlement.

The harbour, known as *Port Jackson*, has been of immense importance in the development of the town, for it is perhaps the finest in the world, being very spacious, well sheltered, and having deep water at all states of the tide. Moreover, the hinterland is very productive and good communications have made the port easily accessible. Also coal and iron are near, thus giving rise to industrial works. Wheat and fruits and ores of various kinds are exported.

MELBOURNE, the second seaport, is the capital of Victoria. It stands at the northern extremity of Port Phillip bay on the River Yarra Yarra, a few miles above Port Phillip. The entrance to the harbour is rather narrow, but inside it is safe and commodious. It was probably the good harbour that first attracted colonists to this port; now many railways converge upon it and it exports a great variety of products including wool, wheat, butter, gold, and wine.

ADELAIDE, the capital of South Australia, situated on the Torrens River, has as its outport Port Adelaide on the Gulf of St. Vincent. The importance of the town is largely due to its splendid situation. It is an important mail port for all the eastern states of the Commonwealth. It is also important as a telegraph station, especially as it is connected by telegraph with Palmerston and so with the oceanic cables of the Old World. It has an extensive agricultural hinterland and is the principal wheat port of the Commonwealth. Wool, copper, and silver also are exported.

BRISBANE, the capital of Queensland, is situated on the Brisbane River and is accessible to ocean-going vessels, although the harbour is not a good one and requires constant dredging. It is on the eastern coast of Australia, about 500 miles north of Sydney. There are several better harbours on the Queensland coast, and this fact tends to diminish the importance of Brisbane. Its position is largely due to its being an outlet for part of the fertile Darling Downs and the highlands of the hinterland—rich in mineral wealth. It has valuable exports of wool and frozen meat, coal, copper, and tin.

FREMANTLE is situated at the mouth of the Swan River in Western Australia and is the chief port of that State. Its harbour has now been put in good condition and it is a port of call for mail steamers. It is connected both by river and rail with the capital, *Perth*, and is the port for that town. Its establishment as a port is due to the fact that it is the first good harbour reached in Australia from Europe. It exports the gold, wool, and wheat of its extensive hinterland.

HOBART, the capital of Tasmania, is well situated on the estuary of the Derwent in the south of the island. A minor

disadvantage is that it is on the side farthest from Australia. Originally Hobart was established as a convict settlement, but it is now a flourishing port, making jams from local fruits and exporting wool and great quantities of apples.

POPULATION

At the last census (1921) the population of the Commonwealth was less than $5\frac{1}{2}$ millions people, and even now it is estimated at little more than 6 millions, the density for the whole of Australia and Tasmania being only 2 to the square mile. About 44 per cent. of Australia, however, is believed to be too arid for settlement and 17 per cent. experiences a hot, humid climate which renders it unfit for development by the white man. At present about 28 per cent. is capable of supporting but a sparse pastoral population, so that of the enormous area of nearly 3 million square miles only about 11 per cent. could support a dense population. As this represents a tract of land almost ten times as large as Ireland however, it will be realised that, even without allowing for an increase of population in the less favoured regions, the Commonwealth at present supports but a mere fraction of the number of people it might support.

The population of Australia is largely urban and is concentrated mainly along the coastal strips, especially in the south-east. Here, in Victoria and New South Wales, the good rainfall and fertile soil give rise to a fairly dense agricultural population. Inland, beyond the edge of the highlands, the population is pastoral and therefore more scattered. Northwards, as the climate becomes hotter, the country is not quite so suitable for white occupation, and, as a consequence, the population is not so dense. Towards the interior, pastoral industries and mining support a rather meagre population, while round the northern and western coasts there are no important centres until Perth is reached. Here there is a relatively dense population, and in the south-west corner of the continent the "Mediterranean" climate enables a fairly dense population to flourish, but from Albany to Adelaide, in the centre of a well-populated region, the coast is barren and, like the arid interior, is for the most part unpopulated. The significance of Australia's population lies in its paucity and the closeness of the country to lands with teeming millions seeking an outlet.

The Australians have a very keen desire to keep their country "white", however, and the following account of the "White Australia" policy by the Right Hon. S. M. Bruce, Prime Minister of the Commonwealth, makes it possible to appreciate their keenness. "The policy of a 'White Australia' is a vital principle in our national life. It is a positive policy, not a policy of negation or of discrimination. It is a cardinal tenet of our

political faith. The principles, beliefs, and aspirations of political parties in Australia are widely at variance on most questions, but on this they unite—it is a question outside party politics. Australia is determined to maintain it at all costs. It is based on fundamental economic principles; and it is not founded upon racial antagonisms. We do not say that other races are inferior; but there are differences—ethical, physical, social, and educational. We do not claim that these differences are all in our favour. Australians are proud of their traditions, their governmental institutions, their conceptions of liberty, and their legal processes. We have set ourselves standards of living which we are determined to maintain. In our new Southern Pacific country we do not desire to perpetuate conditions in the older countries; we desire in this free democracy that all citizens shall have equality of opportunity and a decent living wage; we desire to develop our primary and secondary industries under conditions which will not lower the standards of life which we have set. To realise these ideals we must restrict migration from countries where there is a lower standard of economic life than ours. We do not regard any types of people as actually undesirable; the only undesirables of any country are the criminals, disturbers of the peace, paupers, or the mentally unfit. New-comers must be able readily to assimilate with the present elements of our population; that is the real meaning of the 'White Australia' policy."¹

Nevertheless, though one can but admire the Australians for the great ideals they have set up, it must be admitted that, from the present day economic point of view, they are pursuing a policy which retards development. The great possibilities of the continent cannot be realised while the population remains so inadequate. And even supposing that the temperate and sub-tropical regions can be fully opened up in the reasonably near future, by means of a high birth-rate and immigration from Europe, the fact remains that, unaided by coloured labour, the white man is totally unsuited for the development of the northern lowlands. The regions where white settlement is, at present, impracticable, however, are comparatively small, and, in view of the consequences implied by Mr Bruce, from the Australian point of view the advantages to be derived from the development of such regions would not justify the admission of the coloured races. But, from the world viewpoint, all countries must be used for the general good of mankind. The world as a whole needs the full development of all her territories, and no nation should be allowed to neglect the development of its material resources. Further, the international capitalist wants cheap labour and does not care who does his work so long as he obtains the highest possible rate of profit.

Whether the Australians can maintain their policy and keep

¹ Quoted from an article in the Australia Number of *The Times* (9th May, 1927).

their country "white," therefore, depends largely on the degree to which they can stimulate immigration and fill the empty spaces with Europeans before Asia's industrial, and, possibly, military, naval and aerial, revolution takes place.

AUSTRALIAN DEPENDENCIES

Papua.

The portion of the island of New Guinea lying west of longitude 141° E. belongs to the Dutch. Of the remainder, the southern portion has been a colonial possession of the Empire since 1888, and since 1906 has been administered by the Commonwealth of Australia under the name of "Papua."

Papua, or British New Guinea, is about as large as Great Britain, and is separated from Cape York, Queensland, by Torres Strait. It lies within a few degrees of the equator, is mountainous, and has a narrow, low, and swampy coastal plain. During the cooler months of the year (June to October) the prevailing winds are the South-East Trades, but during the Australian summer it comes within the influence of the North-West Monsoon. At Port Moresby the rainfall is comparatively small and falls during the prevalence of the South-East Trades, for the mountainous backbone of the island shelters this portion of the coast from the North-West Monsoon, but in the extreme south-east rain is brought by both winds and the precipitation is therefore heavy. The climate of the lowlands is unhealthy for the white man and the interior is still largely unexplored, so that the number of European residents is small. The prevailing vegetation is thick tropical forest.

The mountains are rich in *gold* and *copper*, and mining is one of the most important industries. Gold is obtained both on the mainland and in the Louisiade Islands and Woodlark Island, which form part of the territory, and copper deposits are being exploited near Port Moresby. Indications of petroleum have been found over a wide area, and borings are being made by the Anglo-Persian Oil Company on behalf of the Australian Government. In the lowlands, plantations of *coconut palms*, *sisal hemp*, *rubber*, *cocoa*, and *spices* have been laid out, and in the more elevated districts are plantations of *tea*, *coffee*, *tobacco*, and *cotton*. Off the coast are *pearl fisheries*, yielding both *pearls* and *mother of pearl*, and *tortoise shell* and *bêche de mer* are obtained.

The only exports are *copra* and very small quantities of *rubber*, *copper*, *gold*, and *osmiridium*, and the imports consist chiefly of food-stuffs, textiles, and hardware. The trade is chiefly with Queensland and New South Wales.

Port Moresby, the chief port and seat of government, is situated on a good harbour on the south-east coast.

The Territory of New Guinea.

The eastern portion of New Guinea to the north of Papua is, with the Bismark Archipelago and the Solomon Islands, administered by the Commonwealth Government under a mandate from the League of Nations. These former German territories were occupied by an Australian force shortly after the outbreak of the Great War. As in Papua, there is a narrow coastal strip and the interior is mountainous. The climate of the lowlands is equatorial and the vegetation consists of tropical forest. Minerals are plentiful in the interior, but much of the country remains unexplored. The greater part of the cultivated area is planted with coconut palms, and the trade, almost entirely with Australia, is chiefly in *copra*.

Norfolk Island.

This dependency is situated to the east of Australia, 930 miles from Sydney and about 400 miles to the north of New Zealand. Its chief importance is as a cable station on the "all red" Pacific route to Australia and New Zealand.

CHAPTER XIV

NEW ZEALAND AND THE BRITISH SOUTH PACIFIC ISLANDS

THE DOMINION OF NEW ZEALAND

THE Dominion of New Zealand consists of two main islands, known as North Island and South Island, together with Stewart Island and a number of small outlying islands. It is the most isolated of all the British Dominions, for it lies almost in the centre of the water hemisphere, the nearest great land mass, the continent of Australia, being more than 1,000 miles distant. In area New Zealand proper is about five-sixths as large as the British Isles, but as it is a young country in the early stages of its economic development, the population is, by comparison with that of the Mother Country, very small. The total number of inhabitants at the last census was just over 1,344,000. Of these the majority were of British descent, but there were also nearly 63,000 *Maoris*, members of a Polynesian race which originally inhabited the islands. After the subjugation of the Maori tribes in the nineteenth century the natives deteriorated both physically and mentally, but a great change has set in during recent years, chiefly as the result of the spread of education. In consequence, the Maoris, unlike the aborigines of Australia, are steadily increasing in numbers and are likely to form a valuable section of the community.

As compared with Australia, the density for the whole country of nearly 14 persons to the square mile is high, but in comparison with the countries of the East and the highly industrialised countries of the West, it is very low. More than half the population live in towns, but most of these are very small in size, the only towns with more than 100,000 inhabitants being Auckland, Wellington, and Christchurch.

GENERAL PHYSICAL CONDITIONS

Physical Features.

In South Island the most important physical feature is a lofty mountain range, lying nearer to the west coast than to the east, which runs throughout the length of the island. The

central portion has several peaks rising to over 10,000 feet above sea-level, and is appropriately called the *Southern Alps*. In general character the range is not unlike the mountainous backbone of Scandinavia, for it contains many glaciers, is fringed, in the south, with majestic fiords (called "sounds"), and on its landward side the valleys contain long narrow lakes from which rivers, broken by rapids and falls, rush down to the east coast, providing abundant supplies of water power. In North Island the mountains are lower and less continuous than those of South Island and are volcanic in character, their geysers, hot springs, and lakes of boiling mud being world-famous.

The lowland areas of the islands are considerably restricted. In South Island the proximity of the mountains to the west coast causes the western coastal plain to be very narrow. On the east, however, the mountain slopes dip gradually into broad patches of lowland. The most extensive of these are the *Canterbury Plains*, in the central east, and the *Southland Plains*, in the south. In North Island the chief lowland area is that formed by the lower basin of the Waikato River, which, flowing from the volcanic region in the centre of the island, enters the sea to the south of Manukau Harbour. Apart from these the plains are comparatively small and lie along the coasts, separated by mountain saddles.

Climate.

North Island lies in latitudes corresponding to those of Spain, while South Island has a position similar to that of France. Hence, while in South Island the climate is similar to that of the British Islands, North Island experiences a much modified form of the Mediterranean type of climate. In South Island the rainfall is very evenly distributed over the year, but in North Island, though there is everywhere a considerable rainfall in summer, in the Auckland and Napier districts most of the rain falls during winter. In North Island, on the other hand, the rainfall is much more evenly distributed as to place than it is in South Island. (Fig. 38.) In South Island the high mountainous backbone causes the west coast and the windward side of the mountains to receive more than 100 inches of rain a year, but east of the mountains the rainfall rapidly decreases, most of the eastern half of the island receiving less than 40 inches. Part of eastern Otago has less than 20 inches, while the Canterbury Plains have between 20 and 30 inches. In North Island, however, because of the lower elevation of the land and the less continuous nature of the mountains, the rainfall is much more evenly distributed, no part having as much rain as the west of South Island and no part as little as the east.

The great length of the islands, which stretch north-east to south-west for about 1,000 miles, might well lead one to expect

a considerable variety of climate in the different regions, but apart from the difference in the distribution of rainfall, the contrasts between the north and south are surprisingly small. No part of the islands lies within the tropics and their narrowness enables the equalising effect of the ocean to be felt through-

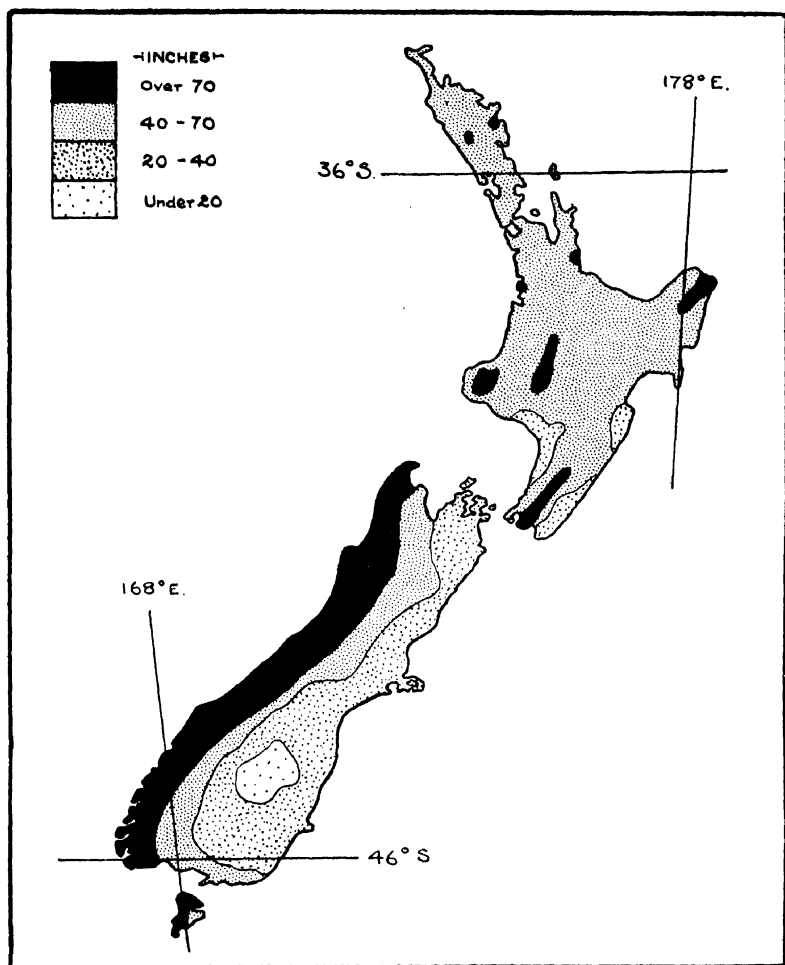


FIG. 38.—THE MEAN ANNUAL RAINFALL OF NEW ZEALAND.

out the whole area, causing the range of temperature between north and south and between summer and winter to be comparatively small. Thus, Auckland, in the north of North Island, has a January mean temperature of 66.5° F., and a July mean of 51.8° F., while at Dunedin, in the south of South Island, the January mean is 57.0° F. and the July mean 41.5° F. Even in

the extreme south, frost and snow are rare, except in the mountains, and throughout the islands agricultural operations can be carried on without interruption and cattle and sheep may be kept in the open even in the depth of winter. The climate is the most healthy in the world, no country having a lower death-rate than New Zealand.

Vegetation.

As a result of the heavy rainfall, much of the islands is, or has been, thickly forested. The west coast of South Island is clothed with dense forests of pine trees, notably the red and white varieties, mixed with cool temperate deciduous trees. In North Island, forests of tropical luxuriance, containing giant ferns, flowering creepers and palm trees, cover much of the land, ascending the mountains to a height of 4,000 feet, and, especially in the Auckland district, there are forests of the gigantic Kauri pine,¹ whose timber is much valued for house and shipbuilding, on account of its great durability. In the drier regions of both islands, grass-land vegetation prevails, but the native grasses are poor and large areas have been ploughed and sown with English grass seed in order to provide suitable pastures for the enormous numbers of sheep and cattle now reared in the country.

PRODUCTS AND INDUSTRIES

Forestry.

The forests, which still cover about a quarter of the total area, yield many useful timbers, and New Zealand's annual output of timber is about 300 million superficial feet. Unfortunately, the needless destruction of much valuable timber has left the industry dependent upon surviving forests which are situated either far inland or in steep country, thus leading to costly transportation. In many cases, sawmills situated near the coast in North America are able to take advantage of the cheapness of sea carriage and market timber in New Zealand at cheaper rates than those prevailing for the local product. Consequently, the imports of timber in each year are greatly in excess of the exports, and the forestry industry of the country is small and is concerned chiefly with partly satisfying the big local demand. Considerations of economy and ease of construction have made timber the most common of all building materials used in the Dominion, and most of the houses are of timber construction. For this purpose, large numbers of trees, notably the Kauri pine, are felled each year. Again, the great export trade in butter demands the provision of a plentiful supply of butter boxes, and these are made from the timber of the white pine, which is inodorous.

¹ Not to be confused with the Karri eucalyptus of Australia.

The most important commercial product of the forests is *Kauri gum*. This is much in demand for the manufacture of fine varnishes, and several thousand tons are exported annually. The gum is exuded from the living trees, but is obtained in the largest quantities by digging on the site of ancient forests, where it is found in a fossilised state a few feet below the surface.

Fishing.

In spite of the fact that the rivers and surrounding seas abound in edible fish of various kinds, the fishing industry is at present of comparatively small importance. This is due to the smallness of the home market and to the absence of neighbouring countries with which a large export trade might be established, though Australia, with her undeveloped fishery resources, is a market for considerable quantities of *oysters* and *schnapper*, a characteristic fish of New Zealand waters. The two chief fishing ports are Auckland and Dunedin, but the greatest potential fisheries lie off the south coast of South Island.

Pastoral Industries.

The enormous importance to New Zealand of her pastoral industries may be judged from the fact that animal products account for over 90 per cent. of the total value of her exports. The Dominion's economic prosperity is pre-eminently based upon the sheep and cattle industries.

SHEEP.—In 1926 the number of sheep in the country was nearly 25 millions. Originally the merino sheep predominated, having been introduced *via* Australia, but, with the introduction of cold storage, an export trade in frozen mutton began to develop and other breeds of sheep, noted more for their flesh than their wool, were introduced. To-day, the great majority of the flocks are composed of cross-bred sheep yielding both wool and mutton.

At one time, the dry Canterbury Plains carried the most sheep, but this area now ranks third after the Hawke's Bay and Wellington districts, each with over 5 million. After the Canterbury Plains, with about $4\frac{1}{2}$ million sheep, follow Otago with about $2\frac{3}{4}$ million, Southland with $1\frac{1}{2}$ million, and Marlborough with over a million, the districts with less than a million sheep being North Auckland, Auckland, Taranaki, Nelson, and Westland.

As in Australia, most of the wool is sold in the Dominion, practically all the wool-buying firms of England sending representatives to attend the sales.

CATTLE.—In 1926 there were nearly $3\frac{1}{2}$ million cattle in the Dominion, most of the leading breeds of British stock being represented. All the districts of North Island carry several

hundred thousand cattle, the largest numbers of both beef and dairy cattle being found in Auckland and Wellington. In South Island, the number of cattle is much smaller, though the Canterbury, Otago, and Southland districts each carry between 100,000 and 200,000.

The excellent climate and the richness of the pasture make out-door feeding possible throughout the year, and *dairying* has become the most important export industry. It is carried on extensively, but particularly in the Wellington district, and large quantities of *butter* and *cheese*, besides considerable quantities of preserved milk and casein, are exported each year, the total export now exceeding that of the old staple product, wool. The rearing of beef cattle also is important, and there is a considerable export of *frozen beef* and a small but increasing export of *canned beef*.

PIGS.—The number of pigs in the Dominion in 1926 was less than half a million, but pigs are being reared in increasing numbers in the dairying districts, and the output of the *ham* and *bacon* factories is worth about £1,000,000 a year. The industry is at present only of local importance, but a valuable export trade may well be developed.

HORSES.—There are about 315,000 horses in the Dominion. They are reared in the greatest numbers in the Canterbury, Auckland, North Auckland, Wellington, Hawke's Bay, and Otago districts, chiefly for local use.

Agriculture.

The cultivation of the land is of comparatively small importance from the point of view of external trade, and agricultural produce accounts for less than 1 per cent. of the total value of the exports. Mixed farming is almost invariably practised, and the farmers usually rear sheep and cattle and cultivate their land as well. The farms consist of small holdings, and the total area under cultivation in 1926, excluding that under sown grasses and in fallow, was only just over 1½ million acres.

CEREALS and ROOT CROPS are produced most extensively in the Canterbury and Otago districts; the rich soil and relatively dry climate of the former making it particularly suitable for *wheat*-growing, while the latter, with its cooler and moister climate, is more suitable for the production of *oats*. The acreage under *barley* is much smaller than that devoted to wheat and oats, the crop being cultivated chiefly in the Marlborough and Nelson districts in connection with the brewing industry. In the Hawke's Bay district, where the climate is relatively warm and moist, quantities of *maize* are produced.

Though the acreage under cereals is comparatively small, the yield per acre is high, averaging over 30 bushels for wheat, 40 for oats, 36 for barley, and 45 for maize. Most of the grain produced is consumed locally.

FRUIT-GROWING is one of the oldest industries of the Dominion, but its development has been slow, and it is only within recent years that the possibilities of building up an export trade have been realised. The country can produce all the British fruits, besides a number usually grown only in warm temperate and sub-tropical regions, and there are now some 6,600 commercial orchards. In the 1926 season, nearly three-quarters of a million cases of *apples* and *pears* were exported, chiefly to Great Britain, and there is a large area of land which might profitably be planted with fruit trees if the export trade in fresh, canned, and preserved fruits could be fully developed. With this end in view, the Dominion Government appoints inspectors to examine all fruit intended for export, realising that only by excelling in the quality of its products can the New Zealand fruit industry hope to compete successfully against countries working under cheaper conditions and more conveniently situated to the British market.

The central ports of the Dominion, Hawke's Bay, Wellington, and Nelson, are the districts most concerned with the production of apples, pears, and small fruits; Otago produces large quantities of apricots; and in the neighbourhood of Auckland, which has a climate of the Mediterranean type, with a relatively low rainfall, the production of citrus fruits, especially oranges, is rapidly developing.

NEW ZEALAND "FLAX" or PHORMIUM TENAX.—As yet the phormium industry cannot strictly be classed under "Agriculture," for attention is only now being given to the cultivation of the plant. Up to the present the fibre has been obtained from the natural phormium areas, which cover hundreds of square miles of low-lying reclaimed swamp country, especially near Hawke's Bay. The plant grows in clumps of sword-shaped blades, some of which are 12 feet long, and is quite unlike the flax grown in Europe; indeed, "flax" is a misnomer, for the plant is more akin to hemp. The best qualities of the fibre are used almost entirely in the manufacture of binder-twine, and the whole of the twine used for the Dominion's harvests—about 2,000 tons a year—is made from it. There is also a large export of the fibre and tow (worth over £500,000 in 1925), and much of the binder-twine manufactured in Australia is made from imported New Zealand fibre. The lower grade fibres are in demand for the manufacture of ropes and cordage, and the tow is used in upholstery.

Mining.

By far the most valuable of New Zealand's minerals, and the only two at present forming the basis of important mining industries, are *gold* and *coal*.

GOLD.—As in Australia, gold-mining in New Zealand is to-day a highly specialised industry, employing a large capital and using the most up-to-date processes for mining the ore and extracting the metal. There are three gold-bearing areas: the Thames-Waihi area in the Auckland district, the west coast of South Island, and the Central Otago area, each of which has produced between 25 and 30 million pounds' worth of gold. The alluvial deposits are now practically exhausted, and about five-sixths of the output is obtained from quartz lodes. The gold production of the Dominion shows a fairly steady decline, the average annual export for the years 1901-10 being £2,000,000, and that for the years 1917-25 not quite £663,000.

COAL.—The principal coal-mines are on the west coast of South Island, behind the ports of Greymouth and Westport, and in the Waikato district of North Island. An estimate of the proved and probable coal resources of the Dominion shows 610 million tons proved and 1,821 million tons probable. The output, however, has never been sufficient for the needs of the country, several hundred thousand tons being imported annually from Australia. About 25 per cent. of the coal is bituminous, 10 per cent. semi-bituminous, and the remainder is brown coal or lignite.

OTHER MINERALS.—*Iron ore* occurs in several parts of the Dominion but has been worked systematically only at Onekaka, in the Nelson district; *sulphur* is plentiful throughout the thermal districts and is worked on White Island; small quantities of *silver* are obtained in association with gold; and *tungsten ore*, *phosphate rock*, *platinum*, *cinnabar*, and *manganese ore* have all been worked on a small scale. The search for workable supplies of petroleum has hitherto been unrewarded.

Manufactures.

New Zealand has two great advantages as a manufacturing country: she has abundant supplies of power, both from coal and water, and a wide range of raw materials. But she has also grave disadvantages in her isolated position, the smallness of her home market, the presence of a serious competitor in Australia, and the lack of an abundant labour supply. She has, therefore, developed a world trade only in those manufactures closely connected with her primary industries, and, instead of a concentrated industrial area, has a multitude of small factories scattered throughout the country.

The manufacturing, or secondary, industries which have hitherto made most progress fall into two groups: (1) Those intimately connected with the primary industries of the Dominion, and (2) those producing goods, from imported or local materials, which are too bulky for importation as finished articles or which

meet special local requirements. In the first group are *butter and cheese making, meat freezing and canning, fruit canning, jam making, woollen manufacture, tanning, boot and shoe manufacture, cement manufacture, pig iron production*, and the manufacture of *twine and rope, soap and candles, bricks, tiles, and pottery*. In the second group are *furniture and cabinet-making, coach and motor-body building, printing, publishing and book-binding, brewing*, and the manufacture of *biscuits and confectionery*, while the manufacture of *agricultural implements and dairying machinery* and the *general engineering* trade are encouraged both by the ability of manufacturers to keep in close touch with local requirements and by the bulk of the products.

The Dominion's industrial future is not easy to foresee, but increased immigration will enlarge her home market and increase the labour supply, and the development of air transport may in the future render of little account the distances which separate her from the old and thickly populated countries of the world. The vast water-power resources of the country are an immense asset, and the electrical system is rapidly being extended. Electricity in New Zealand is by no means a town luxury, for it is used extensively in farming operations, especially in connection with dairying; and the ease with which it can be obtained and the great economies effected by its use have already greatly stimulated industrial activity, both in town and country.

COMMUNICATIONS

The mountainous nature of New Zealand makes the rivers of little use as means of communication, and, consequently, the value of the coasting traffic and of roads and railways has been much enhanced. There are now about 59,000 miles of road in the Dominion, but only some 23,000 miles are metalled, and there is an urgent need of road construction and improvement. Much of the country is still unserved by railways, and such districts can be opened up only by the provision of good roads. The Dominion has over 3,000 miles of railway, all of which, with the exception of a few lines aggregating 118 miles, belong to the Government. (Fig. 39.) In North Island there are two main lines: one connects *Wellington* with *Napier*, on the east coast, and the other passes from *Wellington* through the western part of the island to *Auckland*, continuing up the peninsula as far as *Okaihau*. Branches of this line run along the coast to *New Plymouth* in the south-west, to *Rotorua* in the volcanic lakes and hot springs district, and to *Thames*, at the head of *Hauraki Gulf*.

In South Island the main line runs up the east coast from *Invercargill*, in the south, through *Dunedin*, *Oamaru*, and *Timaru*, to *Christchurch* and its port, *Lyttelton*. This line has numerous

branches serving the Otago and Canterbury districts, and is connected with *Greymouth*, on the west coast, by an important line which crosses the Southern Alps by the Otira Tunnel. This tunnel, which is operated electrically, is over five miles in length,

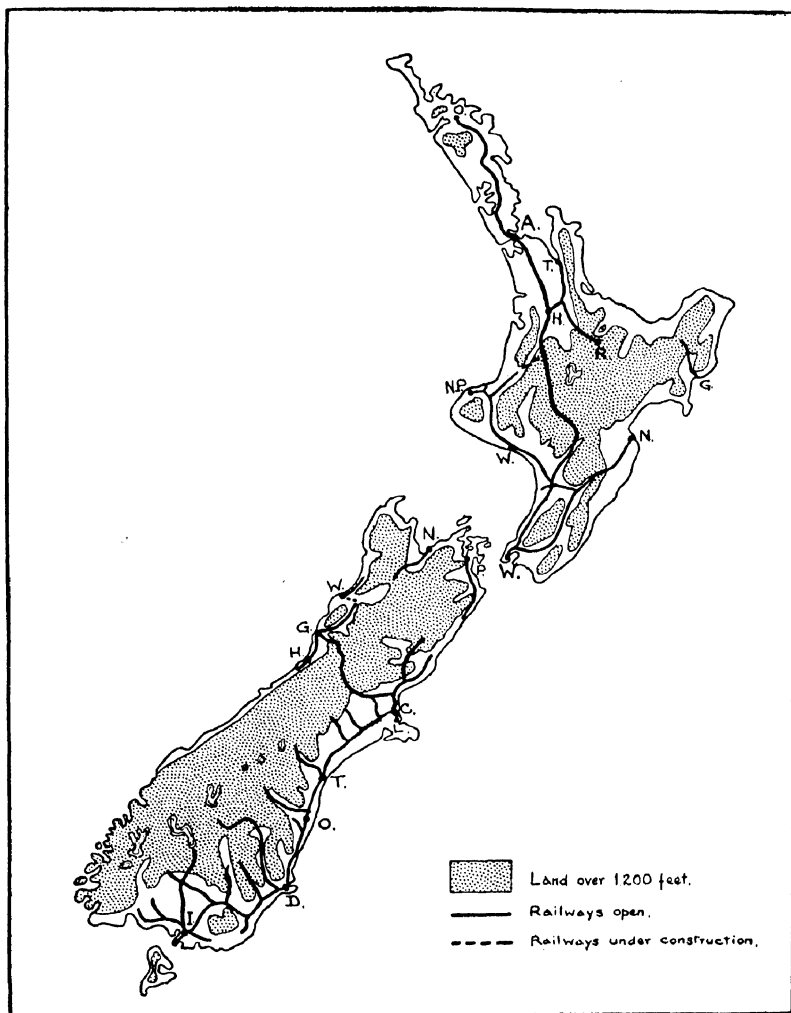


FIG. 39.—THE PRINCIPAL RAILWAYS OF NEW ZEALAND.

and is the longest in the British Empire. On the west coast, Greymouth is connected with *Hokitika*, and the final section of the line, connecting it with *Westport*, is under construction. In the north there are short lines connecting *Nelson* with its hinterland and *Picton* with other north-east coastal towns.

Many parts of the railways still require linking up, but construction is steadily proceeding, and before many years are past few important centres will remain unconnected by rail.

COMMERCE AND SEAPORTS

The *per capita* overseas trade of New Zealand is larger than that of any other country in the world, and, as regards Empire trade, she obtains a larger percentage of her imports from British countries and consigns a larger percentage of her exports to Empire destinations than any other country. In 1926, 86 per cent. of her exports went to other parts of the Empire, and 72 per cent. of her imports came from Empire sources.

By far the greater proportion of the overseas trade is carried on with Great Britain, the Mother Country in 1925 taking nearly 80 per cent. of the Dominion's exports and supplying nearly 50 per cent. of her imports. This close trade connection between two countries over 12,000 miles apart is the outcome of four main influences : (1) Great Britain is the only country admitting New Zealand produce free ; (2) New Zealand has not developed manufacturing industries to the same degree as have Canada and Australia, and relies to a much greater extent on the Mother Country to supply her with manufactured goods, exporting in return foodstuffs and raw materials much needed in Great Britain ; (3) the import trade in British goods has been assisted since 1903 by a tariff preference ; and (4) there is a strong public sentiment in favour of such goods. The share of Britain in the import trade of New Zealand, however, is not as great as it was before the Great War. Other countries, notably the United States of America, which, thanks to the Panama Canal, possesses the supreme advantage of being the nearest great industrial country, have gradually increased their exports to the Dominion. In 1925 the United States supplied 17 per cent. of the total imports, Australia 10 per cent., and Canada 7·5 per cent.

The average total export trade for the years 1920-25 was valued at £47,973,195, and of this figure £40,954,100 were accounted for by the following items : *dairy produce*, £15,757,632 (*butter*, £9,300,736, and *cheese*, £6,456,896), *wool*, £12,146,618, *frozen meat*, £10,150,429, and *hides, skins, and pelts*, £2,899,421. These are, therefore, by far the most important exports of the Dominion, others of less importance being *tallow, sausage-casings, preserved meats, casein, preserved milk, fruit, "flax," Kauri gum, timber, grain, gold, and coal*.

The imports consist chiefly of *iron and steel and metal manufactures* (including *machinery and motor-cars*), *textiles and clothing* ; other considerable items being *oils, sugar, tea, wines, spirits, tobacco, books and stationery, and chemicals*.

The principal seaports through which the overseas trade

passes are Wellington, Auckland, Lyttelton, Dunedin, and Invercargill.

WELLINGTON, the capital of the Dominion, is situated on the magnificent harbour of Port Nicholson, on the northern shore of Cook Strait. By virtue of this and of its central position at the extreme southern end of North Island (Fig. 40), which makes it an important collecting and distributing centre for the whole country, it is the chief city of New Zealand, both commercially

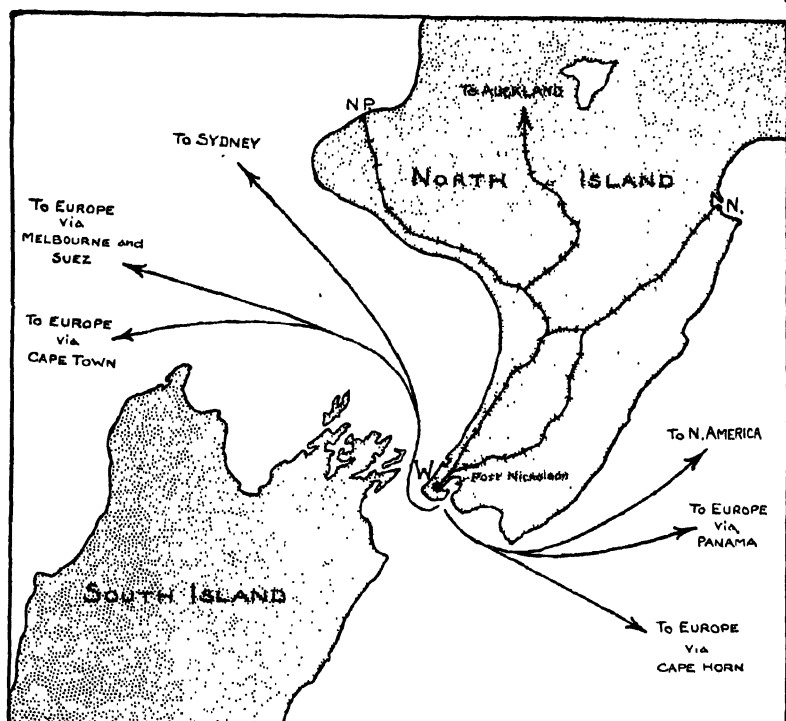


FIG. 40.—THE POSITION OF WELLINGTON.

and industrially. Among its industrial establishments are railway works, flax-mills, saw-mills, meat-freezing and preserving works, and butter and cheese factories, and it exports large quantities of butter and cheese, frozen meat, wool, "flax," and fresh fruit.

AUCKLAND, the old capital and the largest town of New Zealand, is situated on a narrow isthmus in the north of North Island. The port has two excellent harbours, the Waitemata on the east, and the Manukau on the west. Of these the Waitemata is the better and is the more used. The town is the centre of a great producing area, and is the main point for the export

of the Kauri gum and fruit of North Auckland and of the gold and coal of the Waikato valley and Coromandel Peninsula. It also exports dairy produce, timber, and "flax," and it imports tropical produce from the "equatorial" islands of Fiji and Samoa, distributing New Zealand food-stuffs to them. Among its industries are saw-milling, flax-milling, and fruit-preserving.

LYTTELTON, the port of *Christchurch*, the third city of New Zealand, is situated on the east coast of South Island. It is the chief outlet for the Canterbury Plains, exporting large quantities of wool and frozen mutton. Its harbour is the crater of an old volcano.

DUNEDIN, situated in the south-east of South Island on Otago harbour, at whose mouth is *Port Chalmers*, exports the products of the pastoral, agricultural, and mining industries of the Otago district, and has numerous factories operated by hydro-electric power. Large vessels berth at Port Chalmers, but ships of 22-foot draught can now reach Dunedin itself.

INVERCARGILL, the chief port of southern New Zealand, is the outlet for the rich Southland district, which produces wool, frozen mutton, dairy produce, fruit, timber, gold, and coal. It is situated in the extreme south of South Island on New River Harbour, about 17 miles from the sea, and vessels too large to navigate the estuary now berth at *The Bluff*, on Foveaux Strait.

Other ports of less importance are *Hokitika*, *Greymouth*, *Westport*, *Nelson*, *Wanganui*, *Napier*, *Timaru*, and *New Plymouth*.

BRITISH SOUTH PACIFIC ISLANDS

In addition to the islands already mentioned in connection with Australia, there are several hundreds of small islands in the South Pacific which also form part of the British Empire. Some of these, e.g., the *Auckland*, *Chatham*, and *Cook Islands*, form part of the Dominion of New Zealand, while others are administered by her as dependencies. Such are the *Western Samoan Islands*, for which New Zealand holds the mandate of the League of Nations, and the coasts and adjacent islands of the Ross Sea, which form a dependency of the Dominion. Most of the British "South Sea Islands," however, are controlled by the Governor of the British Colony of *Fiji*, who is also High Commissioner for the Western Pacific. These include the *Tonga*, or *Friendly Islands*, the *Gilbert and Ellice Islands*, the *British Solomon Islands*, and the *New Hebrides*. The island of *Nauru* is administered under a mandate conferred on the British Empire.

The Pacific islands are divided physically into two classes: "low" islands and "high" islands. The low islands are built entirely of coral and rise only a short distance above the surface

of the sea, rarely reaching 20 feet in height and frequently much less, while the high islands are volcanic in character and often rise from the depths of the sea to a height of several thousand feet. Nearly all of the islands are in the trade wind zone, and they usually experience a warm, equable climate with abundant rainfall, which, where the soil is fertile, enables *coconut palms*, *sugar-cane*, *bananas* and other tropical fruits to flourish. The "high" islands naturally receive more rainfall than the "low" islands, and their windward sides, which, of course, are most abundantly watered, are generally well timbered. The rich volcanic soil makes them very productive, and consequently well peopled. The natives live principally on fish, coconuts, bananas and other fruits, and *copra* forms a valuable export of most of the islands. Fiji, however, has large sugar-cane plantations, and *sugar* and *molasses* also are important exports.

The trade of the islands has hitherto been carried on chiefly with Australia and New Zealand, but there is now a considerable direct trade with other countries of the Empire and with foreign countries. *Suva*, on Viti-Levu, the largest of the Fiji Islands, is the principal port and acts as an entrepôt for the neighbouring islands. It is also an important coaling station on the route between Western Canada and Australia. In the mandated territory of Western Samoa, the chief port is *Apia*, situated on the island of Upolu, and through this port the exports of *copra* and *cocoa* are despatched.

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